The IRON AGE

MAY 13, 1943

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THE IRON AGE

MAY 13, 1943

ESTABLISHED 1855

Want To Stay in Business?

THE answer to this question will probably be an almost unanimous "yes". But there is more needed than just wanting. You will have to work for it.

Somebody is going to run your business after the war. You hope that somebody will be you. It will be, if all of the you's and you's who own or manage the businesses of this country get to work and do the biggest job that American industrialists have ever had set before them.

It's an even bigger job than the one that you have done or are now doing in connection with the war effort. It's the job of maintaining a production and employment level after the war that will be just about half again as high as any that we attained prior to the beginning of our defense and war programs.

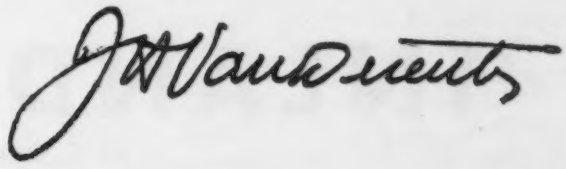
It is a simple matter of arithmetic. With seven or eight million of our best potential producers withdrawn from our labor supply and now in war service, we are still operating at a productivity rate 50 per cent higher than ever before. To keep those people who are now working in industry busy and to take care of the reemployment of our disbanded armed forces will require some very competent planning and action.

Somebody is going to have to provide employment for these people. Either private industry will have to do it or government will. And if government has to do it on this scale, it is almost certain that we will witness the burial of the private enterprise system and the birth of state socialism.

The Committee for Economic Development, which is headed by Paul Hoffman and which was formed at the suggestion of Jesse Jones is the nucleus of an organization which is spreading to every state in the Union and which will endeavor to enlist not merely the cooperation but the active effort of every concern in our country employing 50 men or more. In addition to case studies in six typical industrial centers which are now being surveyed as to post-war employment possibilities, this committee seeks and needs action by every American employer. The action needed is a survey of post-war product and marketing possibilities for both old and new products to determine as closely as possible the number of workers that can expectably be employed in each plant and thus in each community.

Thus far the results have been remarkably encouraging. In the Peoria district, for example, where present employment is approximately 31,000, the expected post war employment shrinkage is less than eight per cent.

This is a job that you cannot "let George do." If it is to be done and the system of private enterprise is to be saved, you will have to do your part in it. So when you are approached by your state or local committee, for your own sake as well as that of the rest of us, give this task everything that you've got.



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"Swarf" is the word used in England for all the metal cut away by machinists' tools—turnings, chips, shavings, etc. There, as in America, "swarf" is valuable because it may contain critical alloys—alloys that cannot be replaced unless reclaimed, and they cannot be reclaimed if "swarf" from various types of steel is mixed. Review your methods of segregation today. See that blueprints are clearly marked for the type of steel to be used. Check your system of "swarf" identification, from machine to truck or railroad car. Establish effective, but simple, markings for machines, tote boxes, chip buggies, V-dump trailers, and salvage bins. Provide adequate supervision to prevent carelessness, and mistakes by new employees.

"Swarf" is valuable stuff. When carefully segregated, it assures more production tools—assures more airplanes, guns, armor for the protection of our fighting men.

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Centrifugal Casting

....a symposium

ORDNANCE and aircraft designers are finding in centrifugal castings the answer to many difficult wartime material problems. Centrifugally cast steel is literally being "rediscovered." Its future holds much promise. Presented herewith are a series of timely, practical reports covering various types of centrifugal castings. These reports touch upon theory, production techniques, design problems, and its advantages. A bibliography will appear next week. This material has been abstracted from papers presented before a recent meeting of the Steel Founders' Society of America.

The Development of Centrifugal Casting

o o o

By C. W. BRIGGS
Technical and Research Director, Steel Founders Society of America

o o o

IN the United States, as elsewhere, the centrifugal casting of steel is still a recent development with the major advances being made in the last 20 years.

While there are a number of different processes of centrifugal casting in commercial operation today the broad principles outlined in an early British patent of Eckhardt, dated 1809, are common to all of them.

The Eckhardt patent included all possible constructions regarding the spindle arrangements and all subsequent patents relate merely to constructional details or special purposes.

The fact that the centrifugal casting of steel has become established only in the last 20 years is based on technical and economic grounds. In the earlier years the problem of driving the rapidly rotating molds was by no means simple and only the introduction of the electric motor and its development permitted the solution of centrifugal movement.

Railway car wheels were probably one of the first products in the United States to be centrifugally cast of cast steel.

The first wheels produced were made at the East St. Louis Works of American Steel Foundries in 1902 and centrifugal casting was carried on until the year 1930.

In the early years of the production of wheels using the centrifugal pouring process, ground manganese was introduced into the first metal going into the mold. Centrifugal action caused this metal to be thrown into the outside of the mold forming the rim and flange, while the plate and hub sections of the mold were formed of the milder steel. This was later superseded by the casting of one grade of steel for the entire wheel.

From 1920 to 1930 the Watertown Arsenal at Watertown, Mass., was engaged in the development of the centrifugal casting of guns.

A molybdenum-vanadium cast steel was cast in a cast iron mold rotated horizontally. The steel was melted in induction furnaces and two guns were cast from the same machine each hour.

Miscellaneous gear castings have been produced for the last 17 years by Sawbrook Steel Castings Co. These gears have been vertically cast in sand molds.

Street car wheels produced from cast steel have been centrifugally cast for the last 16 years by National Malleable and Steel Casting Co. These machines are also of the vertical spindle type.

About 10 years ago a development of casting the high chromium-nickel steels centrifugally for pipe was undertaken by Ohio Steel Foundry and Michigan Steel Casting Co. In both cases these were cast with horizontal spindle machines.

Steel Founders' Society's report of producers in September, 1942, on centrifugally cast carbon and low alloy steel castings showed 14 using vertical spindle units and eight using horizontal spindle units. A number of foundries also have experimental units.

Reduced to its simplest definition, centrifugal casting may be described as the casting of metal under pres-

sure of the centrifugal force developed through high rotative speeds of a specially prepared mold.

The basic requirement is for mechanical equipment capable of various speeds depending on the character of work to be done. Mold equipment varies widely depending upon the design or construction of the basic equipment and the type of castings being produced.

A number of different types of processes for the production of centrifugal steel castings are in commercial operation. The process may be conveniently divided into the following three parts: (1) The method of mold rotation; (2) the method of pouring the mold; and (3) the construction and form of the mold.

Centrifugally produced steel castings are made in molds that are rotated on both vertical and horizontal axis. If the casting to be produced has a depth or length greater than about 2 ft., it is produced in a horizontally rotating mold. This does not mean necessarily that steel castings of less than this length are produced in the vertical spindle units. If the steel casting is produced entirely in a die without core inserts, it will usually be rotated horizontally regardless of its length.

Most steel castings produced in sand molds or core assemblies are rotated by the vertical spindle. Long castings made in sand molds or core assemblies are produced in molds rotated with a horizontal axis. The following examples are given:

(1) Horizontal spindle with die molds: Guns as produced at Watertown Arsenal; corrosion and heat resistant steel tubes, pipes and liners as produced at Ohio Steel Foundry and Michigan Steel Casting Co.; cylinders and liners as produced at Ford Motor Co., American Cast Iron Pipe Co. and Forging & Casting Corp.

(2) Horizontal spindle with sand molds or core assemblies; flanged and grooved miscellaneous castings where a rammed mold or core insert is necessary to form protruding sections or grooves in the outside or inside surfaces of the casting. Castings of this type are produced at American Cast Iron Pipe Co. and Ford Motor Co.

(3) Vertical spindle with die molds; small gear blanks, cluster gears, bushings and liners as produced at Ford Motor Co.

(4) Vertical spindle with die molds and core inserts; gear blanks, sheaves, casing heads and flanges and aeronautical castings as produced at Ford Motor Co., American Cast Iron Pipe and Allegheny Ludlum Steel Corp.

(5) Vertical spindle with sand molds and core inserts; cast tooth gears and gear blanks, unions, sheaves, valve bodies, gates and plugs and other miscellaneous castings, such as produced at Maynard Electric Steel Casting Co., Oklahoma Steel Casting Co., Sawbrook Steel Casting Co., Wehr Steel Co., National Malleable & Steel Casting Co. and Ford Motor Co.

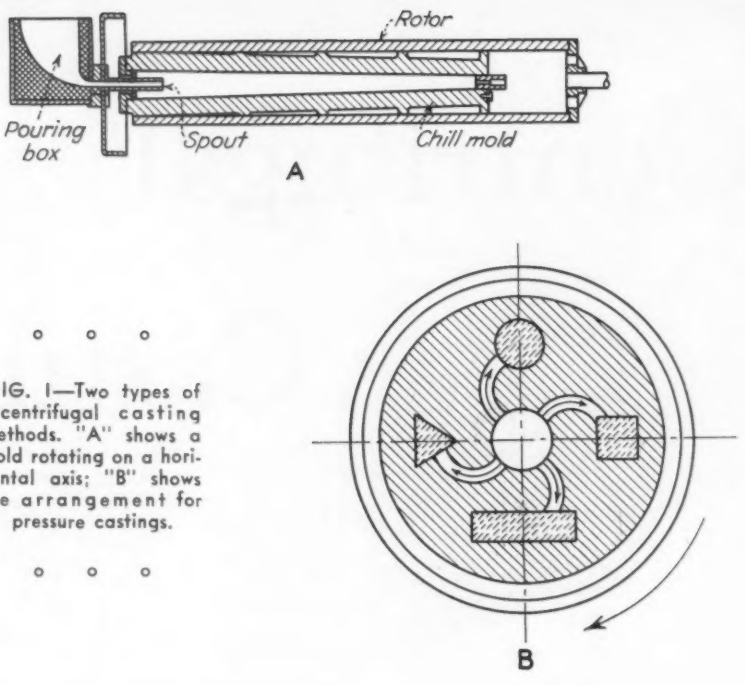


FIG. 1—Two types of centrifugal casting methods. "A" shows a mold rotating on a horizontal axis; "B" shows the arrangement for pressure castings.

Molds which rotate on a horizontal axis are cast by allowing the molten metal to enter a pouring box, the spout of which extends into the rotating mold as shown in Fig. 1 (A). This type of arrangement is used mostly for large and long molds. For the smaller castings produced in large quantities a long lip to pour shank ladle is used. The lip is constructed to extend well inside the horizontal opening.

Molds spun about a vertical axis are cast by pouring the steel through a central opening. This opening is usually made by a runner into the sand mold. Molds are usually poured from hand shanks, and in some cases the molten steel is weighed or carefully measured prior to pouring.

Some centrifugal castings rotated vertically are completely filled with steel before centrifuging. These molds are usually produced in sand with core inserts and may be rather complex in character. It is found that less damage is done to the mold if it is filled with molten steel and then rotated.

The die molds are made of steel or cast iron. A chromium-molybdenum steel is often preferred. The inside surface of the die is slightly tapered to facilitate casting removal.

Most sand molds are core assemblies. The cores are oven dried and are quite hard for handling purposes. Green sand, air dried sand or oven-dried sand molds with core inserts are also used.

Speed of rotation of molds will vary depending on the type of steel casting to be produced. As far as casting shape is concerned, the speed need be only enough to hold the steel against the mold wall. The higher the speed of rotation the greater will be the compacting and cleaning action due to centrifugal force. If the speed is too great, defects in the form of hot tears will propagate. Rotation speeds of 50 to 1200 r.p.m. are used in producing centrifugally cast steel castings. The range most normally used is 150 to 300 r.p.m.

The term centrifugal casting is an all-embracing one and refers to any casting that has been rotated during the time it solidifies. There are, however, three general types of centrifugal steel castings. These are: (1) True centrifugal castings; (2) semi-centrifugal or profiled centrifugal castings; and (3) pressure castings.

True centrifugal castings are obtained by pouring steel in a rotating metal die. The steel solidifies from the die casting interface toward the center of the casting. There are no gates or risers and yields approaching 100 per cent may be obtained. The casting may or may not have a cylindrical hole through its center, depending on whether or not a measured amount of molten steel is poured. The central region of the casting is usually finished by machining.

Semi-centrifugal or profiled centrifugal casting molds may be either

dies, sand or core assembly molds where the inner surfaces of the castings are not formed by centrifugal force alone but by cores. The speeds employed are low. In this case solidification occurs in different directions with the result that shrinkage cavities may appear unless feed heads are provided. Some gates may serve the function of a feed head and others merely as a pouring basin.

Pressure castings involve the use of centrifugal action generating a high pressure to force the molten steel into the mold. This method is used for asymmetrical castings which cannot be spun about their own axis. The mold is arranged as is shown in Fig. 1 (B), so that steel is poured into a gate at the center of rotation. In-gates distribute the steel to mold cavities arranged around the central down gate.

The primary reasons for casting steel centrifugally are to produce castings more economically and to cast a part which can be more satisfactorily cast centrifugally than statically.

A steel casting of a certain design, such as a wheel or a cylinder, when cast statically may result in a yield of 50 to 65 per cent. The same casting may be centrifugally cast with a yield of 65 to 85 per cent. The increased yield usually results in reduced cleaning room costs.

Circular or tubular castings are of ideal design for centrifugal casting. When these objects are made statically, there is a tendency for the development of shrinkage cavities in areas inaccessible to feed heads.

Centrifugal steel castings that solidify progressively from both outside and inside surfaces may also be of inferior quality unless precautions are taken to feed the last portion of the casting to solidify.

The metal solidifies from the outside surface only in the true type of centrifugal castings and there is no possibility of shrinkage cavities occurring.

Slag and bits of furnace or ladle lining or sand included in the steel will be largely eliminated because of the weight differential and the rejection tendency of the bath due to the centrifugal motion.

It has been stated from time to time in literature regarding centrifugal castings that these castings are better quality, denser and have mechanical properties in excess of statically poured castings.

Looking at it from the point of how this statement applies to steel castings it may be said that the statement does not tell the entire story.

If a true centrifugal casting were being compared with a poorly fed statically poured casting, then the statement is correct since the latter would most probably contain shrinkage cavities or areas of center line weakness. Test specimens taken in this zone would not exhibit the density or the mechanical properties of test specimens taken from the true centrifugal casting.

However, if a well fed statically poured steel casting is compared to a true centrifugal steel casting of similar design, there will be no difference in the density of the two castings.

In tensile specimens taken from the heat treatment castings in similar locations, it will be found that near the die face higher mechanical properties will be recorded than can be obtained from a similar area in a statically poured sand mold casting. This is due to the finer structure obtained due to the chilling action of the metal die.

If a well fed statically poured steel casting is compared to a similarly designed profiled or semi-centrifugal casting consisting of a sand mold and core inserts, there will be no difference in the density or the mechanical properties since rates of cooling and effect of mass conditions are similar.

It has been stated in the technical literature that when 20 or more centrifugal castings are required, the cost to the buyer is little more, if any, than for statically produced castings.

There are probably many exceptions to the above statement but it will furnish a clue to at least the general picture of comparative costs.

Centrifugal Casting with Vertical Spindle Machines

o o o

By P. C. POWER
Maynard Electric Steel Casting Co.

o o o

THIS discussion is confined to a description of the centrifugal casting machines and equipment used at Maynard Electric Steel Casting Co., Milwaukee.

The spinner tables are of two sizes —36 in. and 46 in. diameter with 3 7/16 in. diameter spindles mounted in standard duty Shafer Con-Ca-Vex roller bearings and driven through a six strand Tex-Rope drive.

The motors are 3 h.p., 312 r.p.m., 220 volt, 60 cycle, with reduction-geared heads and adjustable brakes, and mounted on slides which give sufficient longitudinal adjustment to permit speed changes from 50 to 450 r.p.m. at the spindle, by using pulleys of various diameters. A sketch of the equipment is shown in Fig. 2.

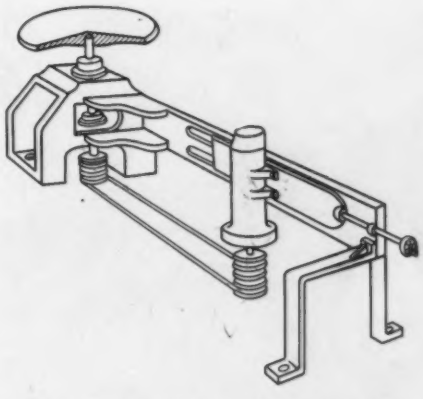


FIG. 2—Sketch of a centrifugal casting machine with a vertical spindle.

Individual safety guards with covers are provided for the 36-in. diameter machines. A hole in the cover is provided for pouring the molds by means of a hand shank or bottom pour ladle.

The centrifugal machines with 46-in. diameter tables are located in a common rectangular shaped enclosure which serves as a safety guard. In general these machines rotate at a lower speed and individual guards are not necessary.

No special mold equipment is required. Standard 20x20 in., 24x24 in., 28 in. round and 38 in. round flasks are used. The molds are assembled with ribbed tops and bottom plates, the top plate having a 7-in. diameter hole located at the center. Screw clamps complete the assembly.

Each spinner table is fabricated for the exact pin center dimensions of the various flasks. Two pins are screwed

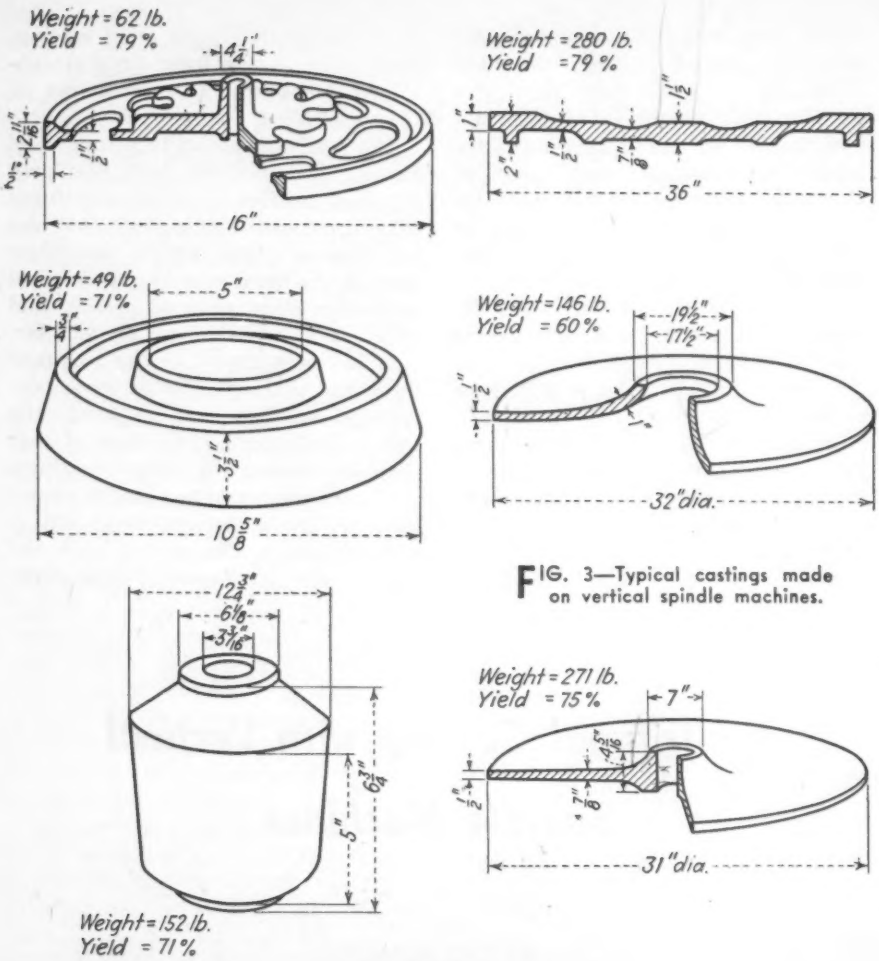
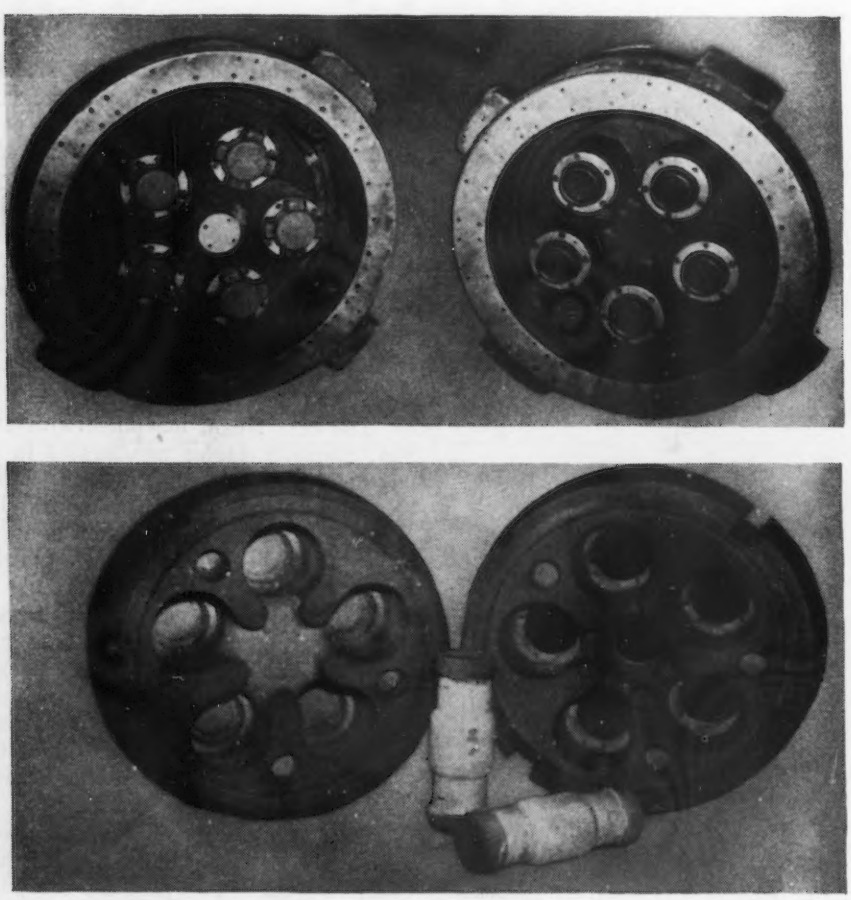


FIG. 3—Typical castings made on vertical spindle machines.

BELOW

Fig. 4—Cluster type pattern, cores and mold.



into the proper holes of spinner table and the mold placed on these pins.

The weight of the mold is sufficient to hold it in place during spinning and removal after pouring is done as quickly and easily as placing the mold on the centrifugal table. The length of centering pins is such that the slightest upward movement of flask allows the pin to clear the lugs of the flask. Centering pins conform to holes in flasks and increase in diameter with the size of the flask.

A battery of 36-in. diameter centrifugal machines, 12 in number, are of the construction described above. The thirteenth machine is of different construction—a direct current type with speed changes from 50 to 600 r.p.m. Experimental work is done on this machine to determine desirable speed for casting. Pulleys of other machines can be changed to provide speed required.

Similarly, in a battery of 46-in. diameter tables—12 are of the type first described, while the thirteenth is equipped with a Reeves speed reducer which permits a variation from 50 to 650 r.p.m. Experimental work can be done on flask sizes up to 38-in. diameter on this machine.

The main source of supply for molten steel is a one ton acid electric furnace. Heats up to 3500 lb., the limit of crane capacity, are available from any one of three four-ton acid electric furnaces.

The number of molds produced per heat varies with the weight of each casting and ranges from 10 for heavy work to more than 26—the number of centrifugal machines. If the type of casting permits, a number of machines are reloaded during the course of a heat, this number being limited by the furnace capacity or length of time that the ladle can be held.

Castings which have been produced centrifugally vary in weight from 30 lb. to 500 lb., and flask sizes range from 20 x 20 in. to as large as 38 in. round.

The types of castings made successfully include blank gears, with arms and with solid webs, sheaves, impeller hubs and impeller covers, double-flanged wheel hubs, plain and flanged rings, bevel and sprocket gears—plain and with teeth, tapered rollers, motor heads, break drums, sprockets, commutator sleeves and commutator rings. Drawings of typical castings made centrifugally are shown in Fig. 3.

A number of factors influence the yield, especially on large castings, but the average is approximately 80 per cent. Whether the mold is filled while spinning or rotated after filling is determined by the character of the cast-

ing. All molds are poured directly through the center. Wire supports for holding center core in place are avoided. The core is nailed in place, because of the tendency to burn off or, as in the case of castings with relatively small hubs, too severe a chilling effect at a critical point.

Centrifugal Casting in Vertical Machines

o o o

By A. T. BAUMER
Wehr Steel Co.

o o o

CASTINGS produced on centrifugal machines at Wehr Steel Co. are all made in cores. The centrifugal machines are all vertical with Veri-pitch pulleys, Tex-rope drum, and single-speed motor. Each unit has an individual motor and starter.

Fig. 4 shows the pattern for cluster type molds where patterns are clustered around center group, and also a cluster type mold. The cores are well-roded or abored to decrease any possibility of breakout of metal. The castings revolve around a central sprue and each casting is poured and fed from this sprue.

In the core assembly of the cluster type, the cores are matched by three markers to prevent shifting. Cores are pasted in a ceiling ring provided for this purpose. The ceiling ring is an extra precaution for securing the core to eliminate the spilling of metal.

Fig. 5 shows the mold assembled. These castings are poured and fed through the sprue provided in center of core. This type of casting is limited, depending on the size of the center core.

The top section of the casting is cast in a permanent mold die which serves as a permanent core and also as a chill in eliminating extra feed for heavy sections on top, which would be necessary if a chill were not used. The mold jacket is placed on a plate and the plate is slipped onto a vertical shaft which is driven as previously explained. The plate has a tapered male dowel arrangement which seats the tub on the plate. Fig. 5 shows the placing of the core in the jacket. The core fits loosely to within 1 to 1½ in. of the bottom where it is engaged by a stepdown or an offset in the diameter in order to secure firmly the core against side motion.

A cover with a flange hole to accept the runner core is clamped into the assembly. The runner core is wedged into the hole and all cores are completely clamped with wedges to the bottom of the plate to prevent raising of the cope.

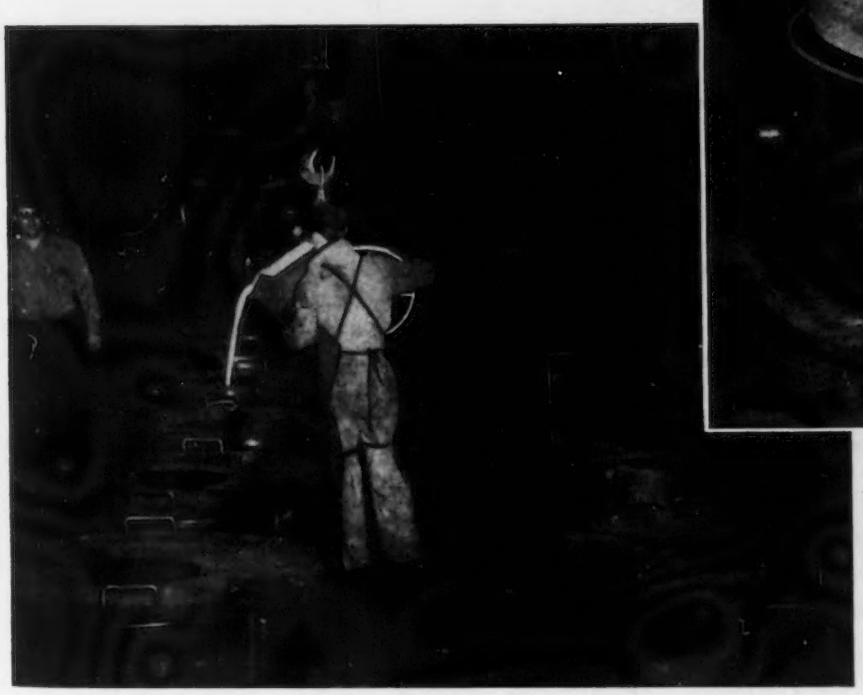
Fig. 6 shows the pouring of molds. The safety apron on each mold, which is adjustable for any height mold, can also be seen. Cores are removed from

o o o

RIGHT

FIG. 5—Cluster type mold assembled.

o o o



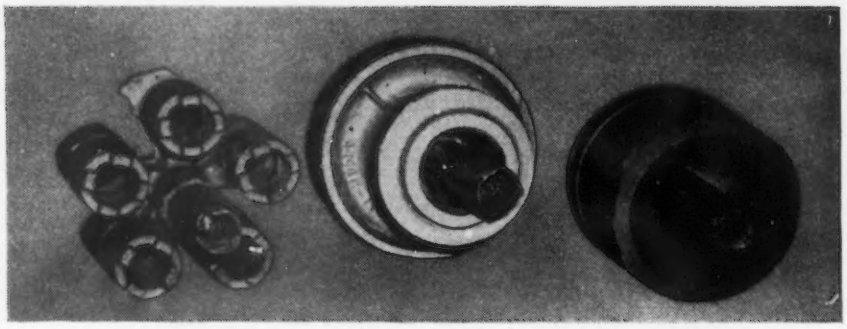
LEFT

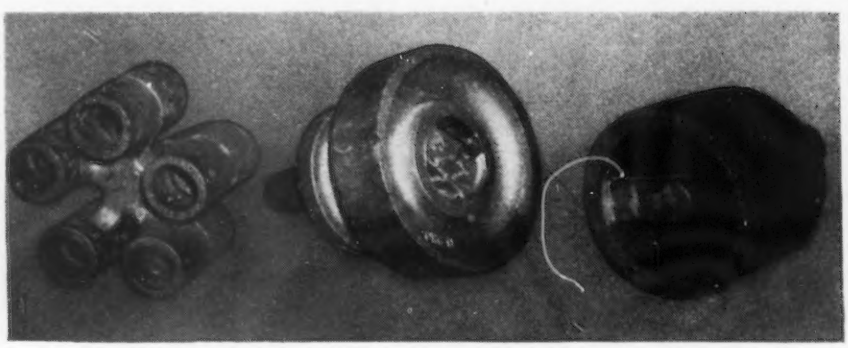
FIG. 6 — Pouring centrifugal molds. Note the safety apron on each mold.

o o o

FIG. 7—Cope and drag view of castings produced in molds shown in Fig. 6. Top view is the cope section, bottom view is the drag.

o o o





the jacker by lifting up the entire jacket and reversing it.

Fig. 7 gives a cope and drag view of the casting, shows gating and feeding arrangements. The flange on the hub which shows a permanent die and chill can also be seen. The heavy casting has two connecting gates to the sprue, while the lighter piece has only one.

The average spinning speeds vary according to the type of casting from 150 to 250 r.p.m. The cost of core molding, while considerably higher than green sand machine molding, is offset by the finished casting, a better casting and a higher yield. The average yield for centrifugal casting is 71.3 per cent.

Punch and Die Life Increased By Colloidal Graphite Lubricant

IT has been found beneficial to pretreat piercers, punches, tools and dies used in metal forming operations with a film of graphite produced with the aid of Aquadag, a dispersion of colloidal graphite in distilled water, made by Acheson Colloids Corp., Port Huron, Mich. Since this product is supplied in a concentrated form, having a solids content of 22 per cent by weight, it is generally diluted from 10 to 20 times its weight with more distilled water or clean condensate, mixing these ingredients into an agglomerate-free solution.

Metal surfaces should first be prepared by thoroughly degreasing them, preferably with a solvent such as trichlorethylene. If the parts are to be sprayed, brushed, or swabbed with the above solution they should be heated to 250 deg. F. so as to evaporate the water rapidly and thus hasten drying of the film and at the same time more tenaciously bond the tiny particles of graphite to the metal. If the parts are small enough to be immersed, it is generally suggested that after the cleaning operation they be heated to 300 deg. F. and dipped rapidly several times in the same mixture so that the objects retain a sufficient amount of heat to evaporate any excess moisture.

Films of graphite formed in this manner have been found to possess desirable low friction properties that will appreciably reduce wear, improve the finish of the formed metal, and frequently eliminate subsequent machining operations. Sometimes, it is found desirable to mildly nitride these metal surfaces prior to the Aquadag treatment. Should any difficulty be observed in complete wetting of the metal, small amounts of brown sugar or some liquid detergent added to the aqueous graphite mixture have been found helpful. To maintain this graphoid film in service many concerns engaged in difficult metal forming operations use a lubricant consisting of the following ingredients:

3% oildag concentrated
7% "dag" graphite dispersion Type 1175
90% paraffine base oil having a Universal Saybolt viscosity of 350 sec. and a minimum flash of 390 deg. F.

This particular formula has been developed for use as a swabbing material, manually applied. For the types of machines that are equipped with an automatic spraying device, a lower viscosity oil should be employed, preferably one having a viscosity of 200 sec. with a relatively high flash point.

Completely blended lubricants of the above nature can be secured from major oil companies. For those operations where it has been decided that water soluble lubricants containing "dag" colloidal graphite are preferred, they likewise are available in a completely blended, ready-for-use form.

Plain Carbon Replaces Alloy Steels

By A. S. JAMESON
Works Metallurgist, International Harvester Co.

. . . Concluding his discussion of the trend to plain carbon steels for heat treated parts, the author investigates choices of steels and treatments in medium carbon grades. Last week he discussed carburizing grades, their treatment and selection.

THE replacement of plain carbon steel for alloy steel in the medium carbon grades is, as in the case of the carburizing grades, a problem of hardenability, involving the use of water as a quenching medium in order to offset the low hardenability of the plain carbon steel, and is accompanied by increased danger of cracking and warpage in hardening.

By suitable selection of steel, however, parts made from AISI C 1045 can be oil quenched in sections of 7/16 in. and under to produce a satisfactory surface hardness, although in a 7/16-in. section the maximum tensile properties are not developed throughout the section. Possibly they are in a ⅛-in. section. A slight increase in the carbon content to AISI C 1050 does increase the hardenability to a point where a 5/32-in. section can develop maximum tensile properties throughout the section after oil quenching, and give satisfactory surface hardness up to a ⅝-in. section.

The problem of where to draw the line dividing water quenching from oil quenching has always been a serious one. For example, if a ½-in. section is water quenched when the carbon content is over 0.44 per cent, the danger of cracking is present; on the other hand, certain heats of steel containing this carbon content do not produce a satisfactory surface hardness on oil quenching. This results in a situation where a heat of steel exhibiting these characteristics cannot be used for heat treated parts, which, to say the least, is embarrassing when the steel has been purchased for the particular application.

Therefore, plain carbon steel must be purchased under rather rigid specifications and with careful planning which requires a knowledge of the application, that is, the section of the part it is to be made into as well as knowledge of the heat treatment it is proposed to give it. The type of heat treat equipment is also an important consideration. For instance, atmosphere controlled furnaces may produce a satisfactory product, whereas an open furnace may not do so. It is certain that where plain carbon steel is extensively used, the metallurgist or heat treater will have a busy time.

The specifying of the proper carbon range as previously stated is based on a study of the part and the method of heat treatment as the hardenability of the steel is related to the carbon content. The AISI list of carbon steels gives a number of steels within a range of 0.32 to 0.50 carbon which is included in the term "medium carbon grades." They are shown in Table I.

The effect of the carbon content on the hardenability is shown in Fig. 1, data for which were obtained from standard end quench specimens quenched from 1550 deg. F. Translating this data in Fig. 1, by calculation based on cooling rates, into terms of cylindrical sections, it is found that

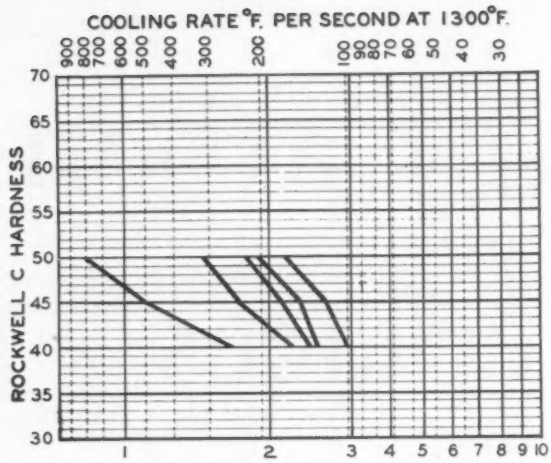
TABLE I

Steels Included in the Term "Medium Carbon Grades" Chemical Range

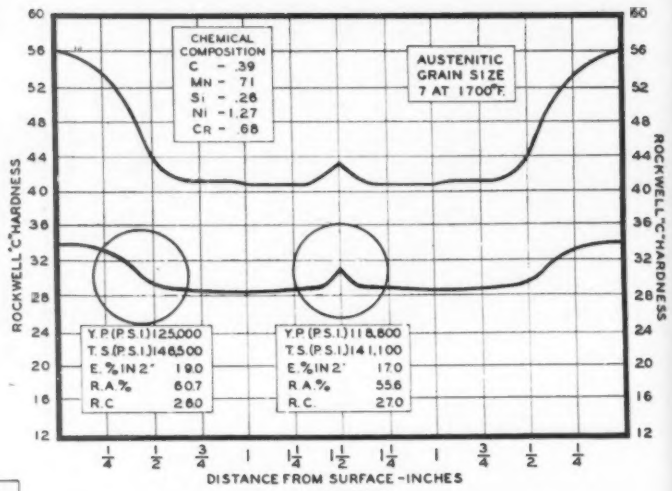
1942 AISI Number	Carbon		Manganese		Phosphorus	Sulphur	*Silicon	
	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Max.
C 1035	0.32	0.38	0.60	0.90	0.04	0.05	0.15	0.30
C 1036	0.32	0.39	1.20	1.90	0.04	0.05	0.15	0.30
†NE 1038	0.35	0.42	0.50	0.80	0.04	0.05	0.15	0.30
C 1040	0.37	0.44	0.60	0.90	0.04	0.05	0.15	0.30
†NE 1041	0.36	0.44	1.20	1.50	0.04	0.05	0.15	0.30
C 1042	0.40	0.47	0.60	0.90	0.04	0.05	0.15	0.30
C 1043	0.40	0.47	0.70	1.00	0.04	0.05	0.15	0.30
C 1045	0.43	0.50	0.60	0.90	0.04	0.05	0.15	0.30

*Silicon range in accordance with remarks under "Carburizing Grades," published last week in THE IRON AGE, as to the necessity for silicon in steels used for heat treating purposes.

†Listed under Hot Rolled Carbon Steel Wire Rods—Steel Products Manual—Section 15, Sheet 1—Nov. 4, 1942.



STEEL A.I.S.I. NO.	CHEMICAL COMPOSITION C	MN	Si	CR	QUENCHING TEMPERATURE	AUSTENITIC GRAIN SIZE	NO. OF HEATS TESTED
C-1035	.35	.71	.21	.06	1550°F.	FINE	8
C-1040	.41	.76	.21	.07			10
C-1045	.45	.87	.23	.05			8
C-1050	.52	.80	.22	.06			6
C-1060	.58	.82	.23	.01			10



ABOVE

FIG. 2—Relation of as quenched hardness to tensile properties of specimen tempered at 900 deg. F. A 3140 3-in. round, water quenched from 1550 deg. F., was used.

LEFT

FIG. 1—The effect of carbon content on the hardenability rating of medium carbon steel specimens quenched from 1550 deg. F.

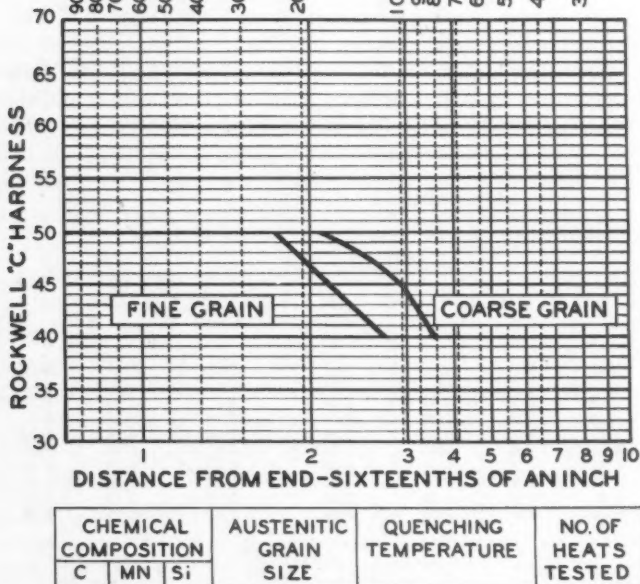
maximum surface hardness and maximum tensile properties would be obtained in the sections as shown in Table II.

A hardness of 45 Rockwell C was used in these calculations as it was assumed to be the lowest hardness in which, after quenching the structure would be at least 50 per cent martensitic. From this condition the steel can be tempered to produce a uniform sorbitic structure, the structure present within the hardness range usually specified for these materials which would ordinarily be 22 to 38 Rockwell C.

A fairly good idea that 45 Rockwell C in the as quenched condition will produce satisfactory physical properties is illustrated in Fig. 2. This figure was drawn from information obtained from quenching a 3-in. round 9 in. long made from A 3140 steel, in water from 1550 deg. F. The upper curve represents the cross-sectional hardness in the as quenched state, the second curve the same cross-section after tempering at 900 deg. F.

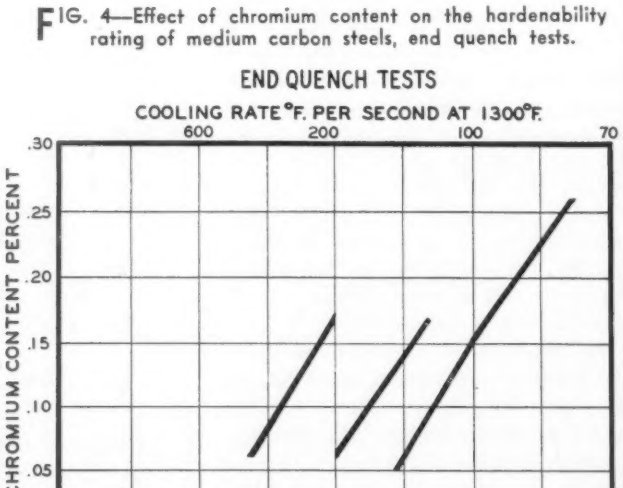
In the tempered condition, standard 0.5 ASTM test bars were machined from the locations as indicated in Fig. 2. The tensile properties obtained are shown. It will be noted the tensile properties, while not as good as those for bars taken from the area which averaged 47 Rockwell C, are still satisfactory when taken from the area which averaged 43 Rockwell C in the as quenched condition.

FIG. 3—Effect of grain size on hardenability of C 1045 steel, end quench test.

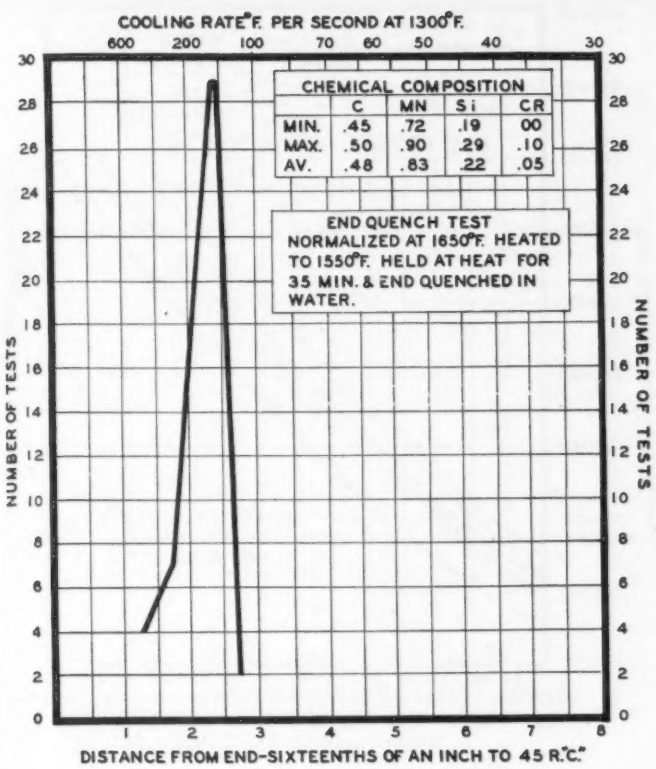

COOLING RATE °F. PER SECOND AT 1300°F.
900 800 700 600 500 400 300 200 100 90 80 70 60 50 40 30
ROCKWELL 'C' HARDNESS
70 65 60 55 50 45 40 35 30
FINE GRAIN
COARSE GRAIN
1 2 3 4 5 6 7 8 9 10
DISTANCE FROM END-SIXTEENTHS OF AN INCH

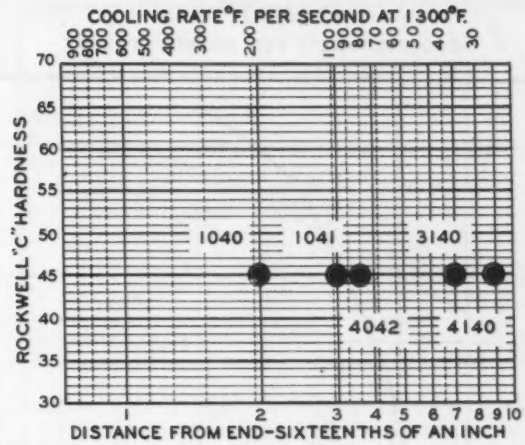
CHEMICAL COMPOSITION C	MN	Si	AUSTENITIC GRAIN SIZE	QUENCHING TEMPERATURE	NO. OF HEATS TESTED
.46	.79	.23	2	1500°F	3
.45	.87	.23	7		8

FIG. 4—Effect of chromium content on the hardenability rating of medium carbon steels, end quench tests.


END QUENCH TESTS
COOLING RATE °F. PER SECOND AT 1300°F.
600 200 100 70
CHROMIUM CONTENT PERCENT
.30 .25 .20 .15 .10 .05 0
1 2 3 4
DISTANCE FROM END-SIXTEENTHS OF AN INCH TO 45 R.°C.

STEEL A.I.S.I. NO.	CHEMICAL COMPOSITION C	MN	Si	CR	QUENCHING TEMPERATURE	AUSTENITIC GRAIN SIZE	NO. OF HEATS TESTED
C-1035	.35	.73	.26	.06	1550°F.	FINE AT 1700°F.	14
	.37	.75	.21	.17			5
C-1040	.41	.76	.22	.05			25
	.42	.76	.22	.17			31
C-1045	.48	.83	.22	.05			41
	.46	.77	.21	.16			14
	.47	.81	.23	.26			16


COOLING RATE °F. PER SECOND AT 1300°F.
600 200 100 70 60 50 40 30
CHEMICAL COMPOSITION
C MN Si CR
MIN. .45 .72 .19 00
MAX. .50 .90 .29 .10
AV. .48 .83 .22 .05
END QUENCH TEST NORMALIZED AT 1650°F. HEATED TO 1550°F. HELD AT HEAT FOR 35 MIN. & END QUENCHED IN WATER.
NUMBER OF TESTS
DISTANCE FROM END-SIXTEENTHS OF AN INCH TO 45 R.'C."


COOLING RATE °F. PER SECOND AT 1300°F.
900 800 700 600 500 400 300 200 100 90 80 70 60 50 40 30
ROCKWELL 'C' HARDNESS
1040
1041
3140
4042
4140
DISTANCE FROM END-SIXTEENTHS OF AN INCH

CHEMICAL COMPOSITION							AUSTENITIC GRAIN SIZE	QUENCHING TEMPERATURE	NO. OF HEATS TESTED
	C	MN	Si	CR	NI	MO			
C-1040	.41	.76	.22	.05			FINE AT 1700°F.	1550°F	26
C-1041	.40	1.48	.21	.02					9
A-3140	.40	.71	.24	.63	1.28				8
A-4042	.44	.83	.25			.24			7
A-4140	.42	.74	.26	.99		.23			13

ABOVE

FIG. 6—Comparative hardenability of plain carbon and 3140, 4042 and 4140 steels; end quench tests, based on J-45 values.

LEFT

FIG. 5—Frequency distribution curve for 42 heats of C 1045 steel, showing hardenability. The steel was fine grained, containing under 0.10 per cent chromium.

From actual cross-sectional hardness tests made on round bars, the sizes given in Table II under the caption, "Size in which maximum tensile properties are obtained," and referred to elsewhere in the test, are quite conservative and represent minimum conditions of hardenability with the specification range, for example, in the case of AISI C 1040 of a carbon content of 0.37 per cent and a manganese content of 0.60 per cent.

The question of grain size also arises in the medium carbon steels. A coarse grain size has a marked effect in increasing the hardenability of the steel, thus enabling large sections to be hardened. This is quite important in the case of oil quenching. It is preferable to have a fine grained steel for all water quenched parts, because fine grained steels show less distortion and are less subject to cracking in hardening.

The effect of grain size is illustrated in Fig. 3. Taking the cooling rates at 45 Rockwell C from Fig. 3 and translating this in terms of the hardening of round bars, in Table III, we have an increase in the hardenable size as shown in Table II, which was for fine grained steel.

As previously referred to under low carbon steel, a slight amount of chromium has an effect in improving the hardenability of the medium carbon steels. When 0.14 to 0.19 per cent is present, it has an effect equal to the effect of changing from fine grain to coarse grain steel. This effect is illustrated in Fig. 4.

The hardenability of 42 heats of AISI C 1045 steel is shown as a distribution frequency curve in Fig. 5.

The hardenability of the plain carbon steels is compared with three standard alloy steels in Fig. 6.

It will be noted that the carbon steel containing 1.48 manganese, as far as hardenability is concerned is at the lower end of the alloy class,

TABLE II

Hardenability of Various Carbon Contents in Terms of Bar Size

AISI Number	Maximum Size in Which at Least 45 Rockwell C is Obtained at the Surface, In.		Size in Which Maximum Tensile Properties are Obtained, In.	
	Oil	Water	Oil	Water
C 1035	....	2 1/4	....	3/16
C 1040	....	3 1/2	....	3/8
C 1045	7/16	3 3/4	1/8	1/2
C 1050	5/8	3 13/16	5/32	3/4
C 1060	1 5/16	3 7/8	1/4	7/8

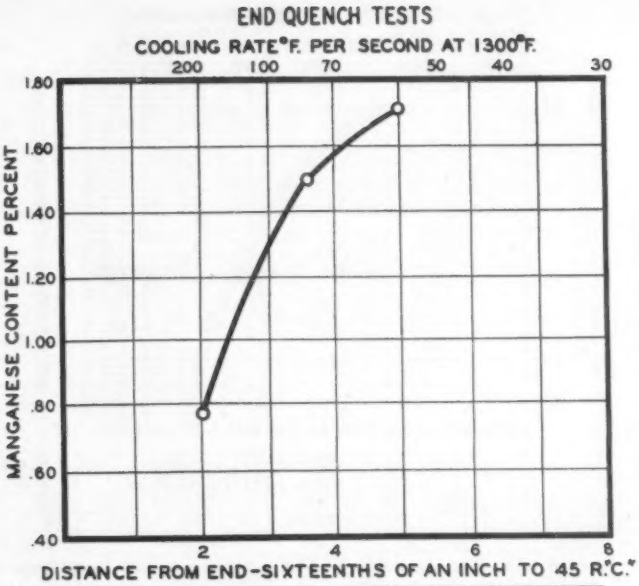
TABLE III

AISI C 1045	Fine Grained	Coarse Grained
Maximum size in which at least 45 Rockwell C is obtained at the surface after quenching in oil.	7/16 in.	1 1/4 in.
Size in which maximum tensile properties are obtained after oil quenching.	1/8 in.	7/16 in.

TABLE IV

Hardenability in Terms of Bar Size Carbon and Alloy Steels

Steel AISI Number	Maximum Size in Which at Least 45 Rockwell C is Obtained at the Surface, In.		Size in Which Maximum Tensile Properties are Obtained, In.	
	Oil	Water	Oil	Water
C 1040	....	3 1/2	....	3/8
C 1041	1 3/8	4 1/16	9/16	1 1/16
A 3140	2 5/8	4 3/4	1 1/4	2
A 4042	1 1/2	4 1/16	5/8	1 13/16
A 4140	3 1/4	5	1 3/4	2 5/8


END QUENCH TESTS
COOLING RATE °F. PER SECOND AT 1300°F.
200 100 70 50 40 30
MANGANESE CONTENT PERCENT
1.80 1.60 1.40 1.20 1.00 .80 .60 .40
2 4 6 8
DISTANCE FROM END-SIXTEENTHS OF AN INCH TO 45 R.C.

STEEL A.I.S.I. NO.	CHEMICAL COMPOSITION				QUENCHING TEMPERATURE	AUSTENITIC GRAIN SIZE
	C	MN	SI	CR		
C-1040	.41	.76	.22	.05	1550°F.	FINE AT 1700°F.
C-1041	.40	1.48	.21	.02		
A-1335	.38	1.73	.22	.05		

FIG. 7—Effect of manganese content on the hardenability rating of medium carbon steel.

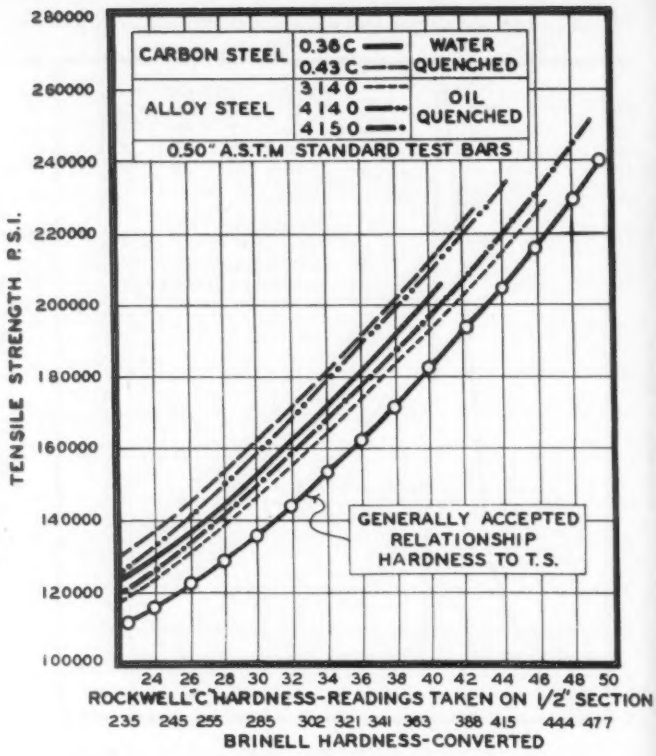
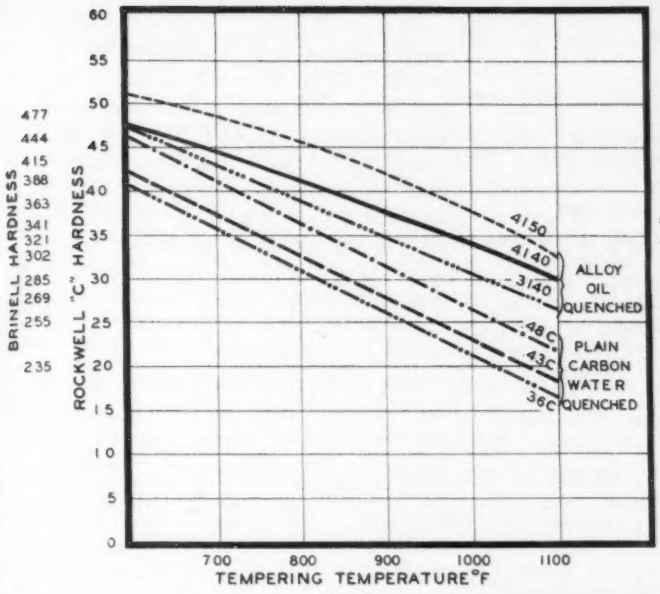

CARBON STEEL 0.38 C —— 0.43 C —— WATER QUENCHED
ALLOY STEEL 3140 ---- 4140 —·— 4150 —·· OIL QUENCHED
0.50" A.S.T.M STANDARD TEST BARS
TENSILE STRENGTH P.S.I.
280000 260000 240000 220000 200000 180000 160000 140000 120000 100000
GENERALLY ACCEPTED RELATIONSHIP HARDNESS TO T.S.
24 26 28 30 32 34 36 38 40 42 44 46 48 50
ROCKWELL "C" HARDNESS-READINGS TAKEN ON 1/2" SECTION
235 245 255 285 302 321 341 363 388 415 444 477
BRINELL HARDNESS-CONVERTED

FIG. 8—The relation of tensile strength to hardness of water quenched carbon steel and oil quenched 3140, 4140 and 4150 steels.

TABLE V

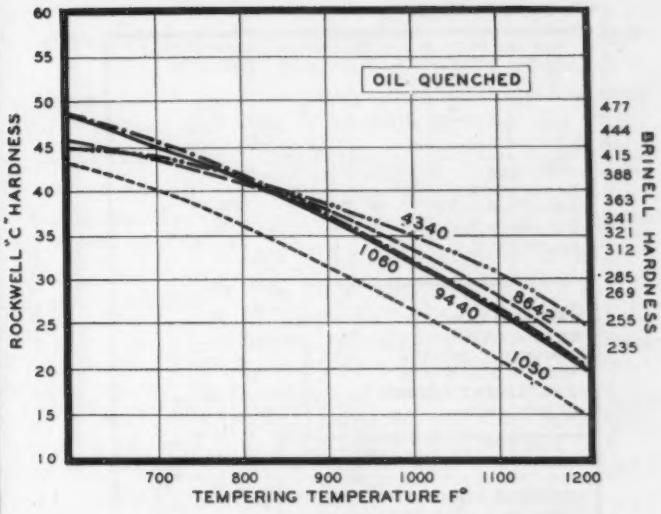
Manufacturing, Hardness Specifications and Other Data for the Parts Shown in Figs. 12 and 13

Item No.	Type of Part	Material Used, AISI No.	Austenitic Grain Size at 1700 deg. F.	Manufacturing Process	Hardness Rockwell C Specified	Heat Treatment Notes
1	Nut	C 1040	Fine	automatic screw machine	30-40	
2	Stud	C 1035	Fine	automatic screw machine	23-31	Quenched in cold water from 1550 deg. F. and tempered at 925 deg. F.
3	Gear	C 1040	Fine	lathe	43-53	Quenched in water (100-130 deg. F.) from 1500 deg. F. and tempered at 400 deg. F.
4	Bolt	C 1035	Fine	automatic screw machine	22-32	Quenched in cold water from 1550 deg. F. and tempered at 925 deg. F.
5	Wrench	C 1035	Fine	drop forging	40-50	Normalized at 1650 deg. F. after forging. Quenched in brine from 1550 deg. F. and tempered at 400 deg. F.
6	Bolt	C 1035	Fine	cold headed	30-38	Quenched in water (90 deg. F.) from 1550 deg. F. and tempered at 800 deg. F.
7	Clutch part	C 1040	Fine	screw machine	30-35	Quenched in warm water from 1500 deg. F. and tempered at 800 deg. F.
8	Coupling part	C 1040	Fine	screw machine	28-37	Quenched in warm water from 1500 deg. F. and tempered at 850 deg. F.
9	Pivot pin	C 1040	Fine	hot headed	23-31	Quenched in cold water from 1525 deg. F. and tempered at 925 deg. F.
10	Pivot pin	C 1040	Fine	automatic screw machine	23-31	Quenched in water (95 deg. F.) from 1525 deg. F. and tempered at 925 deg. F.
11	Piston pin	C 1040	Fine	automatic screw machine	30-40	Quenched in water 100 deg. F. from 1525 deg. F. and tempered at 800 deg. F.
12	Pin	C 1040	Fine	automatic screw machine	30-37	Quenched in water (95 deg. F.) from 1550 deg. F. and tempered at 800 deg. F.
13	Connecting rod	C 1035	Fine	drop forging	15-25	Quenched in water from 1550 deg. F. and tempered at 1050 deg. F.
14	Coupling	C 1040	Fine	screw machine	22-32	Quenched in water (90 deg. F.) from 1525 deg. F. and tempered at 950 deg. F.
15	Shaft	C 1040	Fine	forging	23-31	Quenched in water from 1500 deg. F. and tempered at 925 deg. F.



CHEMICAL COMPOSITION							AUSTENITIC GRAIN SIZE AT 1700 °F	TREATMENT QUENCHING TEMPERATURE °F.
	C	MN	Si	Ni	CR	MO		
4150	.49	.82	.22		.95	.21	FINE	1550
4140	.42	.77	.28		1.00	.24	FINE	1550
3140	.41	.64	.19	1.27	.60		COARSE	1550
C-1045	.48	.71	.27				COARSE	1540
C-1040	.43	.68	.30				FINE	1540
C-1035	.36	.74	.25				FINE	1550
0.50" A.S.T.M. STANDARD TEST SPECIMEN								

FIG. 9—The relationship of hardness to tempering temperature of medium carbon steels, indicating that an increase in the carbon content of the plain carbon steel increases the resistance to softening by tempering.



CHEMICAL COMPOSITION							AUSTENITIC GRAIN SIZE AT 1700°F.	TREATMENT QUENCHING TEMPERATURE °F.
	C	MN	Si	Ni	CR	MO		
NE-8642	.42	.98	.25	.48	.53	.24	FINE	1550
NE-9440	.42	1.08	.48	.35	.29	.12		1550
C-1050	.51	.80	.24					1550
C-1060	.60	.77	.24					1550
A-4340	.43	.54	.21	1.68	.66	.25		1525
0.50" R.D. A.S.T.M. STANDARD TEST SPECIMEN								

FIG. 10—The relationship of hardness to the tempering temperature of medium carbon steels, illustrating the greater resistance of alloy steels to softening by tempering.

equaling in hardenability an A 4042 molybdenum steel, which means that this analysis (C 1041) can be hardened by oil quenching in fairly large sizes (Table IV).

It is well known that an increase in the manganese content will increase the hardenability of steel. Fig. 7 illustrates the effect of manganese on the hardenability of a 0.40 carbon steel.

Converting the data given in Fig. 6 in terms of bar sizes, gives values as shown in Table IV.

The hardenability, which has now been covered in some detail, will have a direct influence on the tensile strength which may be obtained by the heat treatment of various sections.

Theoretically, all the commonly used medium carbon steels, if cooled fast enough to produce the maximum attainable hardness on quenching, which often resolves itself into terms of sections or bar diameters, will have the same tensile strength for a given hardness.

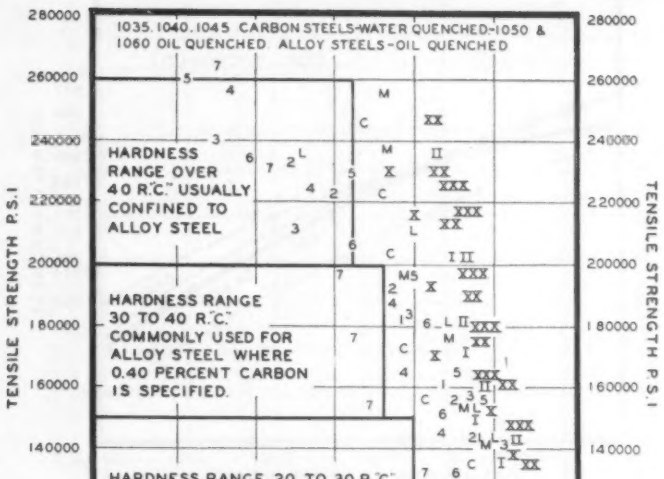
A comparison of plain carbon steel and alloy steel heat treated in ½-in. sections to produce as far as is practicable this maximum obtainable as quenched hardness and tempered to a usable hardness is shown in Fig. 8. According to some authorities, especially the exponents of the use of plain molybdenum steels at least for axle shafts subject to torsional loads, the maximum tensile properties, which means approximately the same hardness at the surface as at the center of the part, are not necessary, as only the near surface is, in service, subject to maximum stress conditions.

Fig. 8 confirms the previous statement that where the section is hardened throughout, a carbon steel maintains the same relationship of hardness to tensile strength as does an alloy steel. It is also true that under the same hardening conditions the yield strength is the same for carbon steels as it is for alloy steels. The ratio of the yield strength is about 90 per cent of the tensile

TABLE VI

Effect of Agitation on Tensile Properties

	Carbon Content Per Cent	Yield Point, Lb. Per Sq. In.	Tensile Strength, Lb. Per Sq. In.	Elongation, Per Cent in 2 In.	Reduction of Area, Percent	Ratio Yield Point to Tensile Strength	Hardness, Rockwell C
Specimen Stationary Mild Oil Agitation.	0.50	111,500	137,000	16.5	54.8	0.82	34
	0.46	139,500	161,000	16.5	49.3	0.87	36
	0.53	141,000	159,000	14.0	50.0	0.89	34
	0.46	116,000	147,300	18.0	49.7	0.80	30
	0.46	119,300	151,200	13.5	45.4	0.79	32
	0.46	102,300	133,900	19.5	54.4	0.77	25
	0.49	127,800	156,500	14.0	41.1	0.82	32
	0.50	110,300	142,300	13.5	39.9	0.78	29
	0.48	120,800	147,300	15.0	36.0	0.82	30
	0.50	127,400	151,600	13.5	35.7	0.84	32
Average	48.4	121,590	148,720	15.4	45.6	0.82	31.4
Specimen in Motion Mild Oil Agitation.	0.52	99,500	136,500	13.0	42.8	0.73	22
	0.50	94,800	133,900	14.5	43.9	0.70	28
	0.50	85,500	126,400	14.7	47.7	0.68	25
	0.48	82,900	123,800	16.2	46.9	0.67	24
	0.46	83,000	116,500	20.2	56.6	0.71	17
	0.49	87,600	122,300	16.7	48.5	0.72	19
	0.50	88,300	128,500	16.2	46.3	0.69	21
	0.48	84,800	126,000	18.0	51.4	0.67	20
	0.50	79,500	119,800	22.0	55.2	0.66	16
	0.50	94,700	134,600	17.5	45.5	0.70	22
Average	49.3	88,060	126,830	16.9	48.3	0.69	21.4



NOTE: AREA TO THE RIGHT OF THE VERTICAL LINES INDICATES SATISFACTORY REDUCTION OF AREA VALUES

STEEL	CODE	CHEMICAL COMPOSITION C	MN	Si	Ni	CR	MO	A.G.S. AT 1700°F.	TREATMENT QUENCHING TEMPS °F
1035	I	.36	.74	.26		.05		6	1550
1040	2	.43	.68	.30				7	1540
1040	3	.39	.71	.29		.30		6	1540
1045	4	.48	.71	.27		.04		2	1540
1045	5	.46	.85	.20		.25		6	1540
1050	6	.51	.80	.24				7	1550
1060	7	.60	.77	.24		.07		6	1550
2340	I	.39	.79	.22	3.71	.14		7	1500
2340	II	.43	.70	.24	3.26	.08		6	1550
3140	X	.41	.64	.19	1.27	.60		3	1550
4340	XX	.43	.54	.21	1.68	.66	.25	8	1525
4640	XXX	.41	.72	.26	1.74	.29	.24	8	1550
4042	C	.44	.85	.26			.22	7	1550
4140	M	.44	.84	.31		.99	.23	7	1550
5140	L	.39	.88	.26		1.05		5	1550

0.50"RD. A.S.T.M. STANDARD TEST SPECIMEN SIZE

strength for fully hardened sections for both carbon and alloy steel after hardening and tempering within a range of 20 to 40 Rockwell C.

The advantage of alloy steels mainly lies in the ability of the alloy steels to harden throughout in larger sections. Without entering into the theoretical aspects, this is accounted for by the alloy steel's capability of attaining a given hardness at slower cooling rates than the carbon steels.

One other observed difference between alloy and carbon steel is that for a given tempering temperature the alloy steel is always harder. This is due to the greater resistance of the alloy steel to softening by tempering. A higher carbon content also has the same effect. These points are brought out in Figs. 9 and 10 which show the relationship of hardness to the tempering temperature for plain carbon and alloy steels. It will be noted in Fig. 9 that an increase in the carbon content of the plain carbon steel from 0.36 per cent to 0.48 per cent increased the resistance to softening by tempering. This is also illustrated by comparing the 4140 alloy with the 4150 alloy steel.

The various alloy compositions do not exhibit the same effect, that is, the rate of the decrease in hardness

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LEFT

FIG. 11 — The relationship of tensile strength to reduction of area for alloy and plain carbon steels.

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BELOW

FIG. 12 — Sketches of parts which are being successfully produced from plain carbon steels.

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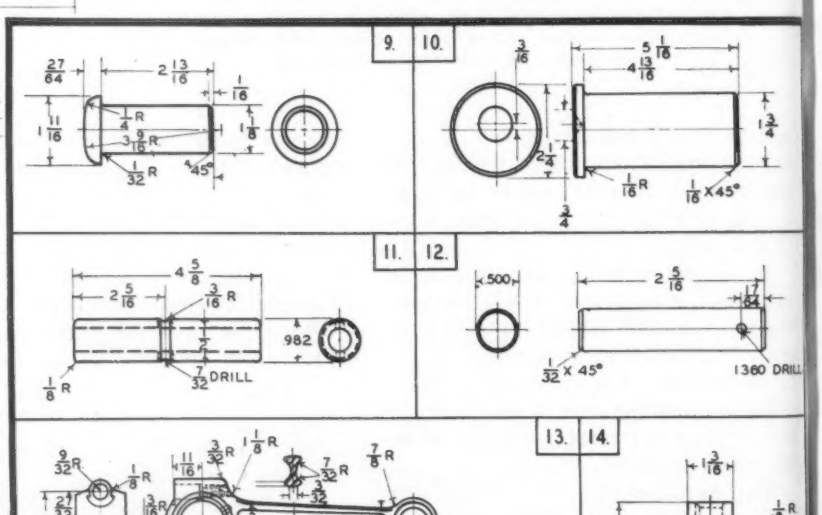
on tempering is not constant. For example, in Fig. 10 it will be noted that NE 9440 decreases in hardness more rapidly than does 4340. Usually chromium-molybdenum combinations are more resistant to softening at higher temperatures. This property for this alloy composition is utilized, for instance in high temperature applications for bolts, tubes, etc. Carbon steels do not do as well as alloy steels in these applications.

Nickel, when added to carbon steels has a marked effect on elongation and reduction of area values, especially in the higher hardness ranges. The effect is to increase these elongation and reduction of area values for a given tensile strength. Chromium and manganese have lower values than steels containing nickel, as also do combinations of chromium and molybdenum and manganese and molybdenum, especially in the higher hardness ranges. However, they do have improved resistance to softening by tempering. This effect is desirable in many applications.



It is generally assumed that the elongation and reduction of area values are a measure of the impact resistance of a steel.

Actual test data showing the differences between carbon and alloy steels are shown in Fig. 11. It is evident from this figure that in the lower hardness ranges the plain carbon, as well as alloy compositions which do not contain nickel, are all satisfactorily based on a value of 50 per cent reduction area. As the hardness increases, the steels containing nickel have a much higher value than do steels which do not contain nickel. This applies particularly to the plain carbon steels over 40 Rockwell C in hardness. The performance of plain carbon steels in hardness over 40 Rockwell C for many applications, particularly for gears, has been found to be not comparable with alloy steels where impact strength is an important requirement.

Fig. 12 shows sketches of parts which are being successfully produced from plain carbon steel. In fact a number of the parts whose function can be easily recognized have been produced from plain carbon steel for many years.

The process of manufacture, the hardness ranges specified, as well as other information for the parts shown in Figs. 12 and 13, are shown in Table V. It will be noted that the water temperature is varied in the heat treatment of the parts. This is an effective means of controlling the rate of cooling in the hardening of a plain carbon steel. By increasing the temperature of the water, cracking is minimized and by the opposite procedure, that is by decreasing the temperature of the water, the rate of cooling may be increased allowing a more uniform surface hardening of parts of a larger section.

Figs. 12 and 13 do not show any parts which are made from C 1045, C 1050 or C 1060 oil quenched, but it has been pointed out that small sections, that is ½ in. and under, can be oil quenched with satisfactory results both as to surface hardness and hardness penetration. In this case, the degree of agitation of the oil is a very important factor in hardening. In order to produce satisfactory mechanical properties, agitation of the oil is a necessary consideration in parts with ½ in. solid sections. The effect of agitation is evident by the data shown in Table VI, obtained from 20 heats of AISI C 1050 steel. The 0.50 test bars were quenched in oil from 1550 deg. F., specimens from ten heats being quenched by placing in a wire basket with mild agitation of the oil, and specimens from the same number of heats quenched by hand agitation of the specimen in the same mildly agitated oil. The specimens were all tempered at 900 deg. F.

It will be noted that there is a distinct decrease in the yield point and tensile strength values and, as is always the case, where fully hardened structures are not obtained in quenching, a decrease in the ratio of the yield point to the tensile strength.

To conclude, a plain carbon steel can in a great many instances be substituted for an alloy steel. Closer supervision is necessary for the production of satisfactory parts. In many cases the part must also be designed for the use of carbon steel.

Spot Welder Converted for Electro-Brazing

AMONG the special-purpose machines converted from peace to war production at General Electric's Schenectady works are some spot welders and seam welding machines previously used for refrigerator unit manufacture and now used for incandescent brazing.

** For a detailed description of these water-cooled brazing tongs and the electro-brazing process, see p. 67, March 4 issue of* THE IRON AGE.

The spot welders were adapted for incandescent brazing by the following three changes:

1. A switch was installed in the controller box to provide the continuous flow of power necessary without the use of the drive motor.

2. The standard spot welding electrodes were replaced by dummy copper electrodes drilled and tapped at one end where copper blocks are attached for the water cooling supply and return.

3. To these copper blocks were attached large water-cooled leads (183,000 circular mills) and brazing tongs.

The leads were made 10 feet in length so that the working area would not be limited to the table. Plier-type brazing tongs* can be connected to these leads and brazing operations performed within a 10-ft. radius of the table. This permits other jobs to be set up while working on one.

The transformers were removed from the seam welding machines, providing immediately an adequate supply of that equipment for permanent installation elsewhere as needed. These spot and seam welding transformers have a range of from 75 to 250 kva. in capacity operating on 550 volts a.c. primary and 4 to 14 volts secondary, having a range of from 0 to 16 points of heat. This extra range in secondary voltage permitted the use of longer leads than would be possible with the 10 and 20-kva. brazing transformers ordinarily used, and were ideal for that reason. They are water cooled, minimizing the possibility of burnouts from overloading.

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BY substituting dummy electrodes with water-cooled leads attached, this spot welder has been converted into use for incandescent carbon brazing. The brazing tongs is shown mounted on the bench at the left foreground.

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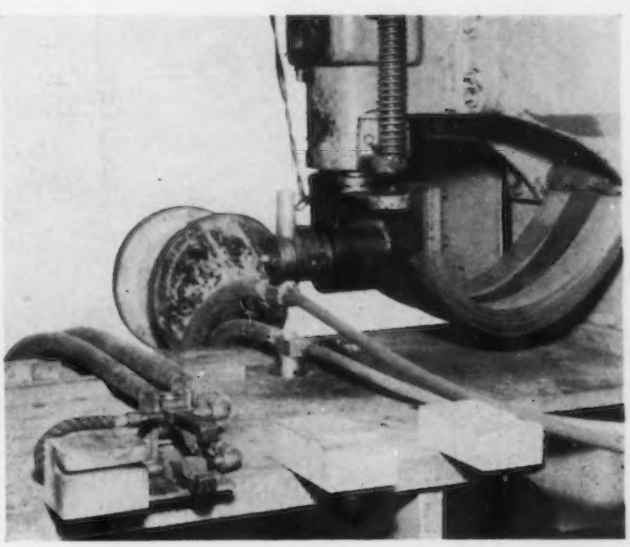


Machining the

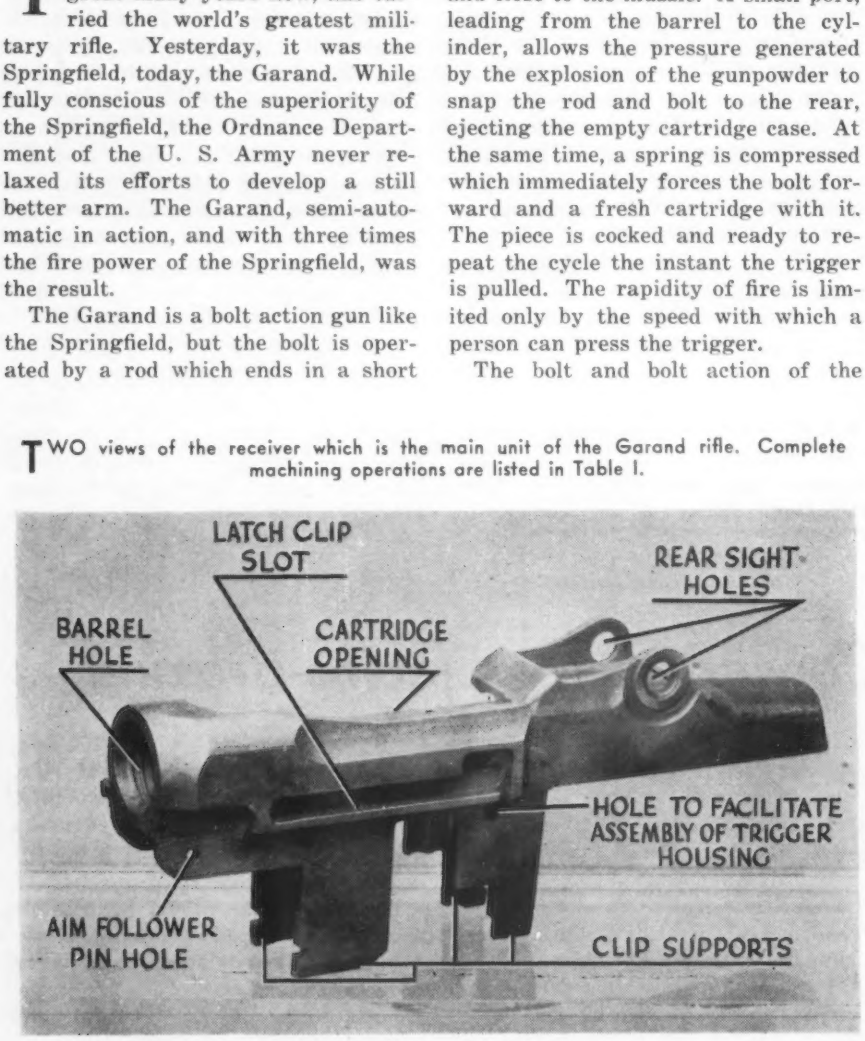
THE American soldier for a great many years now, has carried the world's greatest military rifle. Yesterday, it was the Springfield, today, the Garand. While fully conscious of the superiority of the Springfield, the Ordnance Department of the U. S. Army never relaxed its efforts to develop a still better arm. The Garand, semi-automatic in action, and with three times the fire power of the Springfield, was the result.

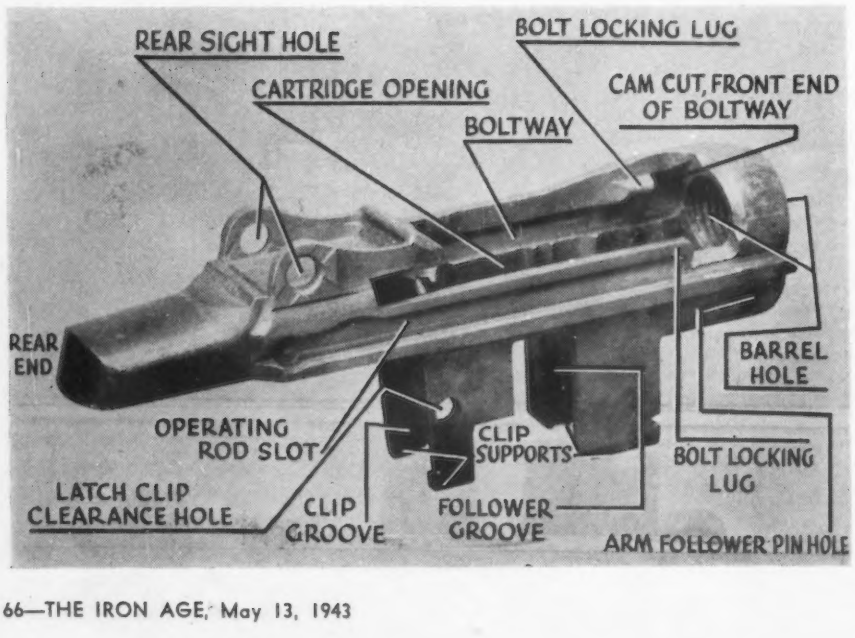
The Garand is a bolt action gun like the Springfield, but the bolt is operated by a rod which ends in a short (6-in.) gas cylinder, under the barrel and close to the muzzle. A small port, leading from the barrel to the cylinder, allows the pressure generated by the explosion of the gunpowder to snap the rod and bolt to the rear, ejecting the empty cartridge case. At the same time, a spring is compressed which immediately forces the bolt forward and a fresh cartridge with it. The piece is cocked and ready to repeat the cycle the instant the trigger is pulled. The rapidity of fire is limited only by the speed with which a person can press the trigger.

The bolt and bolt action of the Garand are quite similar to those of the Springfield. However, in place of the familiar bolt handle of the Springfield, the Garand has an operating lug. This lug nests in a cam recess in the operating slide, and when the slide moves back, it cams the lug and bolt through a few degrees of rotation. Prior to this caming motion, the bolt is locked, that is, the lug and one like it on the opposite side are secure in recesses in the receiver. A slight rotation of the bolt frees the lugs from these recesses, and the bolt is then driven back. At the end of the return stroke, the bolt and lugs are again camed down into the locked position and the rifle is ready to fire. When the bolt is in the extreme rear position and has ejected the empty cartridge case, the follower and spring in the clip (eight cartridges) forces a fresh round up in front of the bolt, and this round is pushed into the barrel chamber on the return stroke of the bolt.

The Garand is possibly the most difficult gun to make. There are 72 parts and almost a thousand machining operations, requiring between two and three thousand gages. And yet, one New England concern tooled up for this difficult and revolutionary job and was producing rifles in approximately a year's time. Most of the preliminary work was in making fixtures, gages and tools for machines already on hand.

TWO views of the receiver which is the main unit of the Garand rifle. Complete machining operations are listed in Table I.





Drop Forged Parts

Many of the parts of the rifle are forged, mostly from bar or rod stock of steels of various analyses. The forgings are normalized and pickled before machining and are heat treated afterward. For forging, the raw material is brought up to temperature in slot-type gas- and oil-fired furnaces and forged in board drop hammers ranging from 800 to 3000 lb. Three impression dies are used. The pieces are forged from the bars until the stock is used up. Heat treating consists of the usual soak, quench and draw, while some parts are carburized. Batch type and some shaker hearth type furnaces, gas- or oil-fired, are employed.

While most of the machine work on the guns is accomplished on modern millers, profilers and drill presses, it was necessary to procure some spe-

Garand Rifle

By BRIG. GEN. JAMES KIRK
Chief, Small Arms Branch, Ordnance Department

. . . Detailed operation sheets are published on three important components of the famous Garand semi-automatic rifle — the receiver, the operating rod handle and the bolt. For similar operations on the new light carbine, the reader is referred to the article in the April 8 issue by the same author.

cial tools. Among the automatic profilers and millers, Pratt & Whitney and Brown & Sharpe machines predominate. The feeds are either hydraulic or electrical. Operators are distributed as sparsely as possible. One part, for instance, requires eight millers, and a single operator loads and unloads all eight. Clip latches are machined on Cincinnati millers with hydraulically operated tables. This clip latch is about 3/16 in. in cross-section and 3 in. in length, and it is necessary later to drill an 8-in. hole through it lengthwise. Three drill presses and a five-part procedure are used.

The work is held in a steel holder or shuttle which can be clamped in any of the stationary fixtures of the three drill presses. The first operation is to drill a ½ in. location hole in one end using the first drill press and centering the hole with a fixture. The piece is then reversed and a similar hole located in the other end. The second drill machines the hole half way through, and the work is reversed and drilled through from the other end. The hole is finally reamed for its entire length on the third drill. Practically the same technique is employed in drilling and reaming the gas cylinder which is about 5 in. in length.

Operation on Receiver

The receiver is the key part of the Garand and comes to the machine shop as a rough forging about 8½ in. long. The original forging weighs 9 lb., but the finished receiver weighs only 1½ lb. The complete operations are listed in Table I. After milling the six faces, using Brown & Sharpe millers for the most part, a hole is drilled through its entire length. Afterward, one end of this hole is threaded to receive the barrel and the rest of it is enlarged in section in subsequent operations. An eight-station Bullard Mult-Au-Matic is used for drilling and reaming. Formerly, part of this machining cycle was accomplished with drill presses as shown on the operation sheet (operations 8A to 8F). The operations in the Bullard are as follows:

Station 1—Unload finished piece and reload

Station 2—Spot drill barrel hole

Station 3—Counterbore for barrel thread

Station 4—Drill barrel hole and spot bolt hole

Station 5—Drill bolt hole

Station 6—Rough bore both holes, and face front end

Station 7—Ream both holes

Station 8—Finish ream both holes.

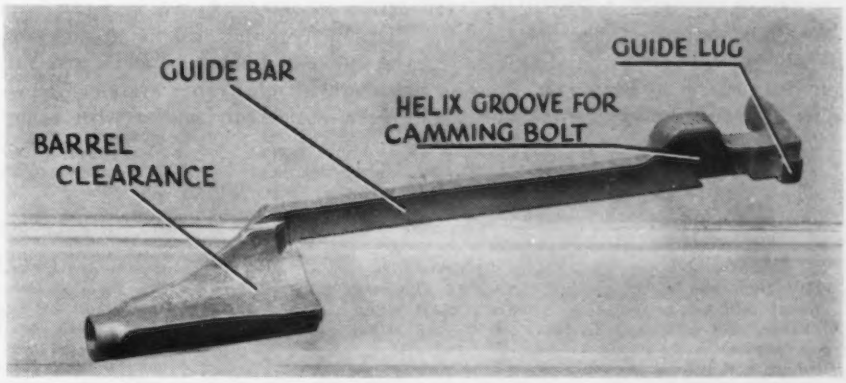
Then follows more milling operations using Brown & Sharpe millers with here and there a Pratt & Whitney profiler.

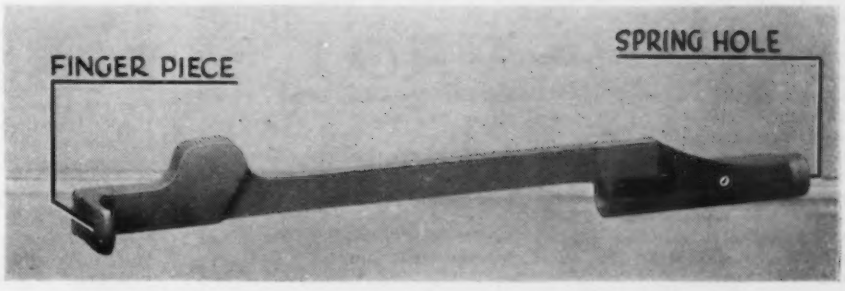
A large portion of the inside of the receiver is now removed to provide the space necessary for the free movement of the bolt, cartridges, etc. This is accomplished with long broaches well designed for balanced cutting on all faces, mounted in heavy fixtures on La Pointe hydraulically operated machines. Three broaches are used, the first having seven cutting edges with approximately 74 teeth to a face. Two slots are used for locating the broach as it is pulled through by the hydraulic ram. The first takes out the major portion but leaves about one-third of the metal for removal by the other two broaches.

The boltway on the receiver is a long slot ending in a radius or profile shape for the bolt-locking lug to move in. A Brown & Sharpe miller is used on which is mounted a cam-operated, rocking cradle fixture to hold the work. The table is fed in a straight line while cutting the boltway, but the work is rotated against the mill by the fixture to develop the profile.

The spring in the cartridge clip pushes against a piece which in turn pushes against the cartridges to feed them into the boltway. This piece is called the follower, and a slot or groove is splined on the inner sides of

VIEWS taken from each side of the operating rod handle. This forging is later flash welded to a tube which forms the operating cylinder.





the clip supports to locate its movement. These slots have a 23-in. radius and are cut on a Pratt & Whitney vertical spliner with a special guide for the head. This guide is built with a 23-in. radius and guides the cutting tools as the head and spline are moved up and down by an eccentric drive. There are two cutting tools so that both grooves are cut simultaneously. A ratchet indexes the tools out 0.002 in. after each stroke for the succeeding cuts.

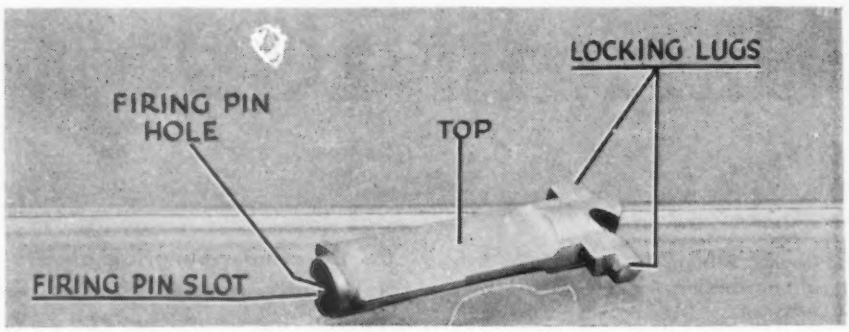
Operations on Rod Handle

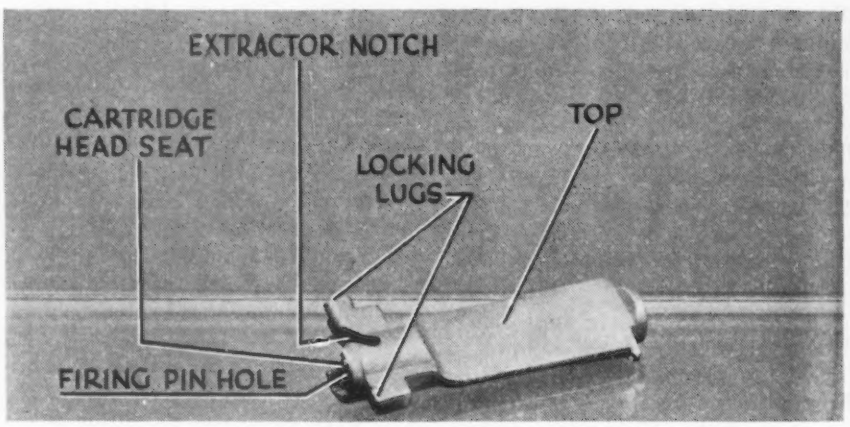
The operating rod handle, the rear portion of the operating rod, which cams the bolt in and out of its locked position and moves it back and forth, starts with a hot-rolled open hearth steel rod. The rods are cut to forging length, heated to forging temperature and formed in 1500-lb. board hammers. The forgings are nomalized, pack annealed, pickled, cold trimmed in a power press equipped with a punch and die and finally coined in a board hammer. After machining to shape, a 15-in. tube is butt welded to the handle in a horizontal Thomson-Gibb electric welder. This tube acts as the operating rod, the farther end moving back and forth in the gas cylinder. In addition it houses the operating spring which is compressed in recoil and returns the rod and bolt to the firing position. Most of the machine operations on the operating rod handle are done with millers and profilers of various makes. The feed mechanisms on these are mechanical, electrical or hydraulic. The complete operations are listed in Table II.

Bolt Sequence of Operations

The top surface of the bolt has a slightly curved contour and this contour is cut by a Brown & Sharpe miller, electronically controlled. A master plate is contoured to conform to this radius, and a guide rod, resting on this master plate, moves up and down with the changes in contour. The other end of this guide rod moves in a control box making and breaking a series of electric circuits progressively. The miller head holding the mills rises and falls with these electrical contacts by means of a motor driven screw. As this motion is slightly irregular, the impulses from the make-and-break system are put through an electronic system. However a Sundstrand miller with a mechanical cam only, is being successfully employed elsewhere. The other machine operations on the bolt are listed in Table III.

The firing pin is turned out in an automotive screw machine from straight stock. One end is then bent at right angles and the head swedged or cold forged to shape in a 50-ton crank press in three operations. The top die is a three-positioned die, which is indexed by hand. The shape of the pin is such that it cannot be machined and would ordinarily be heated and forged.





The Garand bolt is a small but intricate piece which takes 79 operations to machine.

TABLE I
Operations on the Garand Rifle Receiver

OPERATION	MACHINE
1. Mill front end	No. 1-12 Cincinnati miller
2. Rough mill top crosswise	No. 12 B&S miller
2A Rough mill 0.785 slot in bottom crosswise	No. 12 B&S miller
3. Rough mill bottom crosswise	No. 12 B&S miller
4. Rough mill left side	No. 12 B&S miller
5. Finish mill left side	No. 12 B&S miller
5A Finish climb mill bottom crosswise	No. 12 B&S (2) miller
6. Rough mill sight base	No. 10 B&S miller
7. Rough mill right side lengthwise	No. 12 B&S miller
8. Mill cartridge opening, top	No. 1-12 Cincinnati miller
8A Drill hole for milling out stock, rear end bottom	Heavy duty lathe
8B Mill out stock, rear end bottom	No. 12 B&S miller (2)
8C Burr	Bench
8D Drill hole to facilitate edging of cartridge opening	Drill press
8E Rough edge cartridge opening	No. 12 P&W profiler
8F Edge radius right side front end	No. 12B P&W profiler
9. Place in chuck; Spot-drill and ream bolt hole; counterbore barrel hole; finish face front end; bottom left side front of lug	Bullard Mult-Au-Matic
9X Drill and ream bolt and barrel hole, counterbore hole, face front end	Allen 4-spindle drill press (2)
9A Qualify barrel hole and bolt hole	Drill press
10. Burr bottom right side rear end, file burr top face of barrel hole and corner barrel hole	
11. Rough straddle mill sides bottom and center	No. 12 B&S climb miller
12. Finish straddle mill sides	No. 12 B&S climb miller
13. Rough mill right side rear	No. 12 B&S miller
14. Finish mill right side rear	No. 12 B&S climb miller
15. Finish mill wide slot through bottom from front end	No. 12 B&S climb miller
16. Finish mill narrow slot rear from rear end	No. 12 B&S miller
17. Finish mill right side lengthwise (two at a time)	No. 12 B&S climb miller

OPERATION	MACHINE
18. Finish mill top crosswise	No. 12 B&S climb miller
19. Burr left side rear	Bench
21. Edge front end of slot-bottom	No. 12B P&W profiler
21A Burr	Bench
22. Edge for cartridge opening	No. 12B P&W profiler
23. (Dropped)	
24. Burr	
25. 1st. Broach through center	LaPointe broaching machine
26. 2nd. Broach through center	LaPointe broaching machine
27. 3rd. Broach through center	LaPointe broaching machine
28. Edge out stock bottom rear end	No. 12B P&W profiler
29. Burr	Bench
30. Mill boltway in bottom end	Van Norman high speed hand miller
31. Edge top portion of undercut (Hold-bottom rear end)	No. 12B P&W profiler
32. Edge lower portion of undercut. See Oper. 73A	No. 12 P&W profiler
32A Mill rear of boltway bottom	No. 000 B&S miller
33. Edge right side of cartridge opening	No. 12B P&W profiler
34. Rough edge bolt slot, left side	No. 12B P&W profiler
35. Spline rear of slot right side rear of cartridge opening	P&W vert. spliner
36. Buttmill excess stock to facilitate hand milling bottom, left side of bridge	Drill press
37. Mill radius, left side of boltway bottom	Van Norman hand miller
38. Mill radius, right side of boltway bottom	Van Norman hand miller
39. Qualify rear of boltway bottom	Van Norman hand miller
40. Hand mill slot rear end bottom	Nichols hand miller
41. Burr	Bench
42. Spline left-hand side, front end of magazine opening	P&W vert. spliner
43. Spline R. and L. side, rear end of magazine opening	P&W vert. spliner
44. Spline slot bottom of bolt opening, rear of cartridge opening	P&W vert. spliner
45. Edge right side of cartridge opening with shoulder	No. 12B P&W profiler
46. Finish edge bolt, left side	No. 12B P&W profiler
47. Edge left side of cartridge opening and top, right side	No. 12B P&W profiler
48. Edge top of locking lug, left side	No. 12B P&W profiler
49. Edge locking shoulder, left side through barrel hole	No. 12B P&W profiler Spec. blocked up head
50. Edge front end of boltway left side	P&W profiler
50X Mill front end of boltway, left side	B&S spec. miller
50A Rough edge locking cut, right side	P&W profiler
51. Mill radius on locking lug	Nichols hand miller
52. Ream bolt hole at bridge	Hand reamer
55. Circle spline front end inside, left side	Spec. cir. spline machine
56. Spline locking cut, right side	P&W vert. spliner
57. Spline radius on corners of locking cut, right side	P&W vert. spliner
58. Spline radius bottom of locking cut rear face, right side	P&W vert. spliner
59. Shave 0.050 radius on top of rib, right side	Shaper
59A Drill follower arm pin hole	
60. Drill hole on right side rear and buttmill left side rear	5-Spindle drill press
61. Drill latch clip hole	Drill press
62. Rough edge clip latch slot	P&W profiler
63. Finish edge clip latch slot	P&W profiler
64. Edge angle top of clip latch slot	P&W profiler
65. Edge radius in upper side of clip latch slot	P&W profiler
66. Edge clearance left side front end	Profiler
67. Buttmill ring in clip slot	Drill press
68. Spline slot rear of clip latch slot	P&W vert. spliner
69. Burr	Bench
70. Buttmill and drill clip latch pin hole	2-spindle drill press
71. Ream and counterbore clip latch pin hole	2-spindle drill press
72. Buttmill hole to facilitate edging operation; rod handle slot 1	Drill press
73. Rough edge operating rod slot and edge radius top of lugs right side of cartridge opening	P&W profiler
74. Finish edge operating rod slot	P&W profiler
75. Edge undercut in operating slot	P&W profiler
76. Edge sight base	Profiler

OPERATION	MACHINE
76A Burr	Bench
77. Drill sight base hole	Drill press
77A Burr	Bench
78. Ream sight base hole	Drill press
79. Edge undercut front of sight base	Profiler
80. Edge slot rear sight base and edge round corner, right and left top front of sight base	Profiler
81. Spline angle slot and bevel left side rear of cartridge opening	P&W vert. spliner
82. Spline slot, left and right sides clearance for knob on clip	
83. Spline bevel, left side rear of cartridge opening	P&W vert. spliner
84. Edge radius, top rear end of cartridge opening, right side	No. 12B P&W profiling machine
85. Buttmill radius, left side top of clip slot	Drill press
86. Spline slot, right side rear of magazine opening	P&W vert. spliner
87. Edge slots, right and left side of magazine opening bottom	P&W profiler
88. Spline front of lugs, right and left side of magazine opening bottom	P&W vert. spliner
89. Spline bottom of lug, right and left side of magazine opening bottom	P&W vert. spliner
90. Handmill slots, front of magazine opening	Nichols hand miller
91. Handmill right and left side bottom of lugs front of magazine opening	Nichols hand miller
91A Handmill rail front end, right side (blend cut)	Hand miller
92. Edge angle, left side of barrel hole	Profiler with raised head
93. Edge radius, left side of top	Profiler
94. Edge bevel, front of sight base	Profiler
97. Handmill slots, right side of sight hole	Van Norman hand miller
98. Mill radius, right side front end and radius right side below rear sight base	No. 1-H Milwaukee miller
99. Mill top over barrel hole left side	No. 1-H Milwaukee miller
100. Mill rear end, rough (1 at a time)	No. 1-H Milwaukee miller
101. Mill rear end, finish (1 at a time)	No. 1-H Milwaukee miller
102. Rough mill right and left sides top near end	No. 1-H Milwaukee miller
103. Finish mill right and left side top rear end and radius on right side rear of sight base	Duplex miller
104. Burr and wash	
105. Spline follower slots on radius	P&W vert. spliner, rebuilt
106. Edge right side of sight base	P&W profiler
107. Handmill corner rear of barrel hole	Van Norman hand miller
108. Ream and counterbore follower arm pin hole and rear hole right side rear of magazine opening and ream	
109. Countersink sight hole right and left sides	Drill press
110. Ream clip latch hole and ream arm follower pin hole left side	4-spindle drill press
111. Qualify rough front end	Heavy 14 in. Reed speed lathe
112. Finish qualify front end	Besley grinder
113. Burr ream barrel hole	Bench
114. Mill rear of sight base	Van Norman hand miller
115. Hollowmill left side rear sight base to facilitate handmilling serrations	2-spindle drill press
116. Circle spline firing pin cam, rear of bridge, right side	Spec. cir. spl. machine
117. Circle spline mill cam cut, rear of slot in bridge	Spec. cir. spl. machine
118. Handmill 60 serrations, left side of sight hole	Nichols hand miller
119. Burr	Bench
120. Mill thread in barrel hole	P&W thread miller
121. Inspect for alinement of barrel hole and fit if necessary	Bench
122. Burr and corner	Bench
123. Jig file top of sight base	Bench
124. Qualify bolt locking cuts, R.H. and L.H.	Bench

OPERATION	MACHINE
125. Corner locking lugs	Bench
126. Fit bolt gage to receiver	Bench
127. Fit latch clip gage	Bench
128. Stamp piece number	Bench
129. Mark zero line, left sight lug	Bench
130. Burr rear of sight base and stamp graduations	Bench
131. Inspect (done by U. S. Gov't)	Bench
132. Ream barrel hole to 0.923 dia. to 1.8 depth	Drill press
133. Grind bolt way and left side of receiver rear end	
134. Corner and burr rear of boltway, right side, and burr top of sight lugs, burr sight hole, left side, try operation rod and try plug in bolt hole at bridge and correct	
135. Qualify broach clip slot	Bench
136. Polish top rear end so as to facilitate rolling inscription	Polishing frame
137. Stamp gun number	Bench
138. Roll inscription	Inscription roller
139. Final inspection	Bench

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TABLE II

Operations on the Garand Operating Rod Handle

OPERATION	MACHINE
1. Rough mill shoulder, crosswise	Lincoln miller
1A Rough straddle mill front end, rough mill left side of bar and finish mill left side, front end crosswise	No. 1-12 Cincinnati miller
2. Burr	Bench
3. Straighten and inspect	
4. Drill oper. rod, spring hole	Allen 2-spindle drill press
5. Ream oper. rod, spring hole	2-spindle drill press
6. Straighten and inspect	Bench
7. Rough grind corners, front end	Bench, emery wheel
8. Rough and finish turn shoulder and face front end	No. 2 Warner & Swasey screw machine
9. Inspect	
9A Rough mill right side, crosswise	No. 12 P&W semi-automatic miller
10. Mill right side, crosswise	No. 12 B&S miller
11. Mill top side, crosswise	No. 12 B&S miller
12. Burr	Bench
13. Mill bottom, crosswise	No. 12 B&S miller
14. Finish mill rear end oper. rod spring hole section, left side	No. 12 B&S miller
14A Mill rear end of handle	No. 1-H Milwaukee miller
15. Burr and burr ream	Bench
16. Rough mill barrel clearance	No. 1-12 Cincinnati miller
17. Finish mill barrel clearance	No. 1-12 Cincinnati miller
18. Mill 0.305 in. step in guide bar	No. 000 B&S miller
19. Burr	Bench
20. Rough mill radius on front end	No. 1-H Milwaukee miller
21. Finish mill radius on front end, bottom	No. 1-H Milwaukee miller
23. Finish mill 45 deg. angle front end, bottom	No. 1-H Milwaukee miller
24. Mill 0.058 in. land on finger bar bottom, rear end	No. 1-H Milwaukee miller
25. Mill 0.320 in. and 0.108 in. dimensions on guide lug	No. 000 B&S miller
26. Burr	Bench
27. Mill 0.040 in. step, left side of finger piece, top, lengthwise	No. 000 B&S miller
28. Mill chamfer bottom left edge, crosswise	No. 1-H Milwaukee miller
29. Mill cam lug left side to 0.030 in.	No. 1-H Milwaukee miller
30. Mill 30 deg. angle and 0.25 in. radius right side, front of finger piece	No. 1-H Milwaukee miller
31. Burr	
32. Hand mill 0.700 in. radius and side of guide lug to 0.265 in.	Nichols hand miller
32A Hand mill	Hand miller
33. Circle mill right side front of finger piece	Van Norman hand miller
34. Burr	Bench
35. Edge radius on back of finger piece	No. 12B P&W profiler
36. Edge radius on inside of finger piece	No. 12B P&W profiler
37. Burr	Bench
38. Edge 0.710 in. radius left side of bar	No. 12B P&W profiler
39. Edge 0.085 and 0.655 in. radius on end of finger piece	No. 12B P&W profiler
40. Burr	Bench
41. Rough mill helix groove	Nichols hand miller
42. Rough edge helix groove	No. 12B P&W profiler
42X Rough mill helix	Cincinnati spec. cam miller
43. Rough and finish profile helical 3.140 in. lead	No. 12B P&W profiler
43X Finish mill helical 3.140 in. lead	Cincinnati spec. cam miller
44. Rough and finish profile 95.24 in. helical lead	No. 12B P&W profiler
44X Finish mill helical 95.24 in. lead	Cincinnati spec. cam miller
44A Grind (blend) mill cuts right side	Polishing frame
45. Stamp piece mark	Perkins power press
45A Tumble	
46. Finish corner and file	Bench
46A File 45 deg. bevel, bottom left side	Bench
47. Inspect	Bench
48. Flash weld handle to oper. rod	Horizontal Thomson-Gibb welder
49. Remove flash inside	Turret lathe
49A Rough and finish line ream to 0.401 in. i.d.	Turret lathe
51. Remove flash from outside burrs from end of hole and finish tube to length, 17.170 in.	No. 15 Reed speed lathe
52. Rough mill 0.625 in. radius, 4 deg. angle and top of latch	No. 000 B&S miller
53. Finish mill 0.625 in. radius 4 deg. angle and top of latch	No. 1-H Milwaukee miller
54. Edge 20 and 4 deg. angle	No. 12 P&W profiler
55. Burr and hand ream hole	Bench
55A Corner 0.010 radius on catch	
56. Inspect	Bench
57. Weld piston tube to assembly	Vertical Thomson-Gibb elec. elec. welder
58. Bend to shape rough	Bench
58A Test, oil and pack in tray	Bench
59. (Dropped)	
60. Grind piston to finish length	Special grinder
61. Grind outside diameter and mirror polish end of piston	Special grinder
61A Grind corner at open end of tube	Bench
62. Inspect	Bench
63. Straighten and bend to finish shape	Bench

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TABLE III

Operations on the Garand Bolt

OPERATION	MACHINE
1. Straddle mill front and rear end (two at a time)	No. 1-H Milwaukee miller
2. Drill and ream firing pin hole three diameters and face rear end to length, rough and finish hollow mill hub and end of lugs	Chucking machine
3. Center front end, rough	Drill press
4. Cut 45 deg. chamfer on rear end	Speed lathe
5. Ream firing pin hole to 0.076 in.	
6. Center front end, finish	Drill press
7. Finish mill top front end, lengthwise	No. 1-H Milwaukee miller
8. Burr	Bench
9. Rough hollow mill hub front end and face front of lugs	2-spindle drill press
10. Finish skive (or turn) hub front end and face off lugs	Lathe
11. Burr	Bench
12. Finish mill bottom, front	No. 1-H Milwaukee miller
13. Finish mill bottom, rear end, lengthwise	No. 1-H Milwaukee miller
14. Mill slot bottom of lug, right side, front end	B&S miller
15. (Dropped)	
16. Contour mill top (two at a time) (A)	Miller with spec. attachment
17. (Dropped)	

OPERATION	MACHINE
18. Hollow mill angle on top of rear end	Drill press
19. Drill taper ream hole in rear end	2-spindle drill press
20. Burr	Bench
21. Rough mill right side	No. 1-H Milwaukee miller
22. Rough mill left side	No. 1-H Milwaukee miller
23. Finish circle mill right side	No. 12 B&S miller
24. Finish circle mill left side	No. 12 B&S miller
25. Burr	Bench
26. Contour mill bottom surface lengthwise (two at a time) (A)	No. 12 B&S with special attachment
27. Qualify top of lugs and angles on lug rear end, left side	No. 000 B&S miller
28. Mill slot in bottom front, left side	No. 000 B&S miller
29. Mill slot in bottom on front of right side	No. 000 B&S miller
30. Mill angle on top front of lug on left side	No. 000 B&S power miller
31. Straddle mill angles on right and left side of rear end	No. 1-H Milwaukee miller
32. Stamp piece number	Perkins power press
33. Mill left side to facilitate edging	Hand miller
34. Circle mill helix on right side front of lug	Nichols hand miller with speed mill attachment
35. Circle mill cam on back of lug on right side of top	Nichols hand miller with speed mill attachments
36. Burr	Bench
37. Mill to facilitate edging large portion right side bottom	Nichols hand miller
38. Edge slot on right side of front end	No. 12B P&W profiler
39. Edge large portion of right side, bottom	P&W profiler
40. Edge large portion of left side on bottom	P&W profiler
41. Profile notch and 0.095 in. radius on rear end	P&W profiler
42. Mill hammer caming notch, rear end	
43. Burr	Bench
44. Mill excess stock from front end	No. 1-H Milwaukee miller
45. Burr	Bench
46. Drill ejector pinhole and hole for draining heat treat salts	2-spindle drill press
47. Ream ejector pin hole	2-spindle drill press
48. Burr ream firing pin hole rear end 0.216 in. diameter	Lathe
49. Rough counterbore for cartridge head seat	Reed lathe

OPERATION	MACHINE
50. Finish counterbore for cartridge head seat	Reed lathe
52. Burr	Bench
53. Chamfer front end, angle and two radii	2-spindle drill press
54. Spot drill, drill and buttmill extractor stem hole	3-spindle drill press
54A. Qualify extractor stem hole	Drill press
55. Ream extractor stem hole	Drill press
56. Mill firing pin slot	
57. Profile radius left front lug lower side	P&W profiler
58. Profile radius on right front lug, lower and upper side	P&W profiler
59. Profile extractor slot in front end	P&W profiler
60. Spline notch in front end	P&W vertical spliner
61. Spline angle on extractor slot, front end	P&W vertical spliner
62. Countersink rear end of firing pin hole	Bench
63. Spline angle on extractor slot	P&W vertical spliner
64. Burr ream firing pin hole	Reed lathe
65. Burr	
66. Drill extractor spring hole	Drill press
67. Ream extractor spring hole	Drill press
68. Buttmill 0.250 dia. bottom front, right side locking lug	Drill press
69. Qualify cartridge head seat	Bench
69A. Rough and finish circle mill locking cam on right and left side (A)	Van Norman hand miller with high speed head
70. Form ream shape of firing pin hole (Rough)	Drill press
71. Qualify shape of firing pin hole	Drill press
72. Burr ream ejector and extractor hole	3-spindle drill press
72A. Grind lugs on left side to 0.640 in. dimension	Surface grinder
73. Corner and file	Bench
73A. Burr	Bench
74. Inspect machining	Bench
75. Tumble (A)	Tumbling barrel
76. Grind back of locking lugs	Bench
77. Drill hardening salts out of firing pin hole	Drill press
78. Drill hardening salts out of extractor hole and extractor spring hole	Drill press
79. Drill hardening salts out of ejector	Drill press

Comparable Arc Welding Electrodes

SHORTAGE of supply of all classes of arc welding electrodes is forcing buyers to seek alternate sources of rods required in war production. To aid in making substitutions for electrodes, the accompanying tables have been prepared. These tables show the various trade designations of electrodes corresponding to the AWS-ASTM Tentative Specifications for Iron and Steel Arc Welding Electrodes (Serial designation A 233-42T, issued 1940, revised 1942) and also to the American Iron and Steel Institute stainless steel classification numbers. The data have been compiled from information supplied by the various manufacturers.

The E4500 lightly coated mild steel electrodes are being widely used for repair work and for structural welding because of the tightness of supply of the heavily coated electrodes. Electrodes of this type are satisfactory only where service conditions are not too severe. They are usable only with d.c. and on straight polarity (electrode negative). The E4510 classification is commonly known as a sul-coated or sul-finish electrode and is sometimes referred to as a bare electrode. The sul is produced by rusting the wire in a water spray, after which the wire is dipped in a lime bath and drawn. The E4511 electrode is a similar electrode except that the coating is applied after drawing rather than before. Of the many coating materials used, the most common are iron oxide and calcium carbonate, which is the principal arc stabilizing material.

The E4520 and E4521 electrodes are adapted only for flat position and horizontal fillet welding. The coatings for this type of electrode are formulated to produce high melting rates with spray type transfer of weld metal. E4521 electrode overlaps with E4520 in usage and operation although it is generally limited to automatic welding and therefore the wire is usually knurled before the coating application.

The E6010 electrode is perhaps the most popular shielded arc type for all-position welding. Electrodes of this classification are usable only with d.c. of reverse polarity. The coating is generally classified as a cellulosic type. The core wire is low carbon rimmed steel.

The E6011 electrode is a new development and is similar in operating characteristics to E6010 except that it is designed for use with a.c. It is also similar in many respects to E6013.

The E6012 electrode is an all-position d.c. straight polarity type and is often referred to as a poor fit-up electrode because of its ability to bridge wide gaps in joints. It is particularly well adapted for single layer welding of horizontal fillets. E6013 is intended to be similar to E6012 type but has improved arc characteristics for use with a.c. It can also be used on d.c. Both these rods use titanium oxide (rutile) as the primary slag forming constituent.

The E6020 electrode is essentially a heavy mineral coated electrode intended for horizontal fillets and flat positions on direct or alternating current, although it is mainly used with the latter. The electrode has numerous applications where very high quality weld metal is required and the work is positioned.

The E6030 classification overlaps with E6020, the difference being that the coating produces a smaller amount of slag and a less fluid one, thus decreasing the possibility of slag interference in deep grooves. Both are sometimes referred to as "hot" rods because much higher current densities can be used with them and the deposition rate is highest of all the AWS classifications.

Heavily coated low alloy steel electrodes are classified from E7010 and up. Incidentally, the first two digits in all these classification numbers give the minimum tensile strength in thousands of pounds per sq. in., in this case, 70,000 lb. The E8000 series would be 80,000 lb., etc. E7010 electrodes are often classed as carbon-molybdenum electrodes because their weld deposits usually contain 0.40 to 0.60 per cent molybdenum, although the electrode wire itself is a low alloy steel type. The molybdenum is contained in the coating. The coating materials are of the same nature as those of E6010, but include ferro-molybdenum or other molybdenum containing materials.

Electrodes which fall into the classification E7011 are mineral coated types similar to plain carbon coated electrodes of the E6011 and E6013 types, except that there are additional alloying ingredients in either the coating or the core wire. This electrode is an all-position type for use on either direct or alternating current.

Electrode E7020 may be compared directly with E6020 in all operating respects except that the tensile strength of the as-deposited metal is higher. It is used for horizontal fillets and flat position work on either direct or alternating current. The E7030 electrode is very similar.

Stainless Steel Rods

The stainless steel electrodes may be classified in two groups according to the alloy content. The high chrome-nickel or austenitic alloys contain at least 17 per cent chromium and 7 per cent nickel. Straight chromium ferritic alloys may be divided into the hardenable alloys which contain 15 per cent chromium or less and the non-hardenable which contain more than 15 per cent chromium. Stainless electrodes may be used in all positions. Mineral coatings are generally used since gas shielding by the use of cellulose coatings is undesirable because of the possibility of carbon pick-up. The desirability of highly basic slags accounts for the use of calcium carbonate and other calcium minerals in the coating. The core wire for stainless electrodes generally contain more chromium than required in the deposit, to compensate for the losses through the arc. Certain other elements such as columbium and to a less extent molybdenum, are not fully recovered through arc welding and must have slightly higher percentages in the core wire than required in the deposit.

During the last year some modified types of stainless steel rods have been developed for welding armor plate. The exact analyses of these rods is restricted information but comparable grades have been listed for the three types of modified analyses used.

In the listings shown on the accompanying table, a certain amount of overlapping may be observed. This is largely because of the fact that the tentative specifications for arc welding electrodes merely call for certain physical properties to be met, such as tensile strength, yield point and elongation in the as-deposited material. However, in recent months, the trend has been very definitely toward a standardization of welding electrodes not only from the physical point of view, but also from the point of view of electrode coating formulation.

TABLE I

Comparable Arc Welding Electrodes for Steel

A. W. S. Class No.	Description	Trade Designations Used by Various Manufacturers				
		Air Reduction	Allied Weld-Craft	American Agile	Anthony Carlin	Champion Rivet
E 4510	Wire with coating applied before drawing	Airco No. 41	Arc-Craft B			Champion Speed Rod
E 4511	Wire with light coating applied after drawing	Airco Nos. 63 & 44			P-180	Processed
E 4520	Wire with coating applied before drawing		Arc-Craft B			Speed Rod
E 4521	Wire with light coating applied after drawing					Speed Rod
E 6010	Heavy coating, D. C. Electrode positive	Airco 78E & 79E	Arc-Craft 55 & 55W	Red-White	*P-50-x *P-50-x V & O	*Blue Devil
E 6011	Heavy coating, A. C.	Airco No. 230	77 & 77W			Bluedac
E 6012	Heavy coating, D. C. or A. C., electrode neg.	Airco No. 87	70 & 70W	Blue-Red Red-White	P60 & P61	Gray Devil & Gray Devil No. 2
E 6013	Heavy coating, A. C. usually	Airco No. 90	77W		P-100	Bluedac
E 6020	Electrode neg. for fillets; pos. for flats; A. C. also	Airco No. 81	60	Blue-Grey	*P-70	*Black Devil
E 6030	Electrode pos. on D. C. Also A. C.	Airco No. 83		Blue-Grey	*P-80	*Black Devil
E 7010	D. C., electrode pos.	Airco No. 93	Arc-Craft Moly	Black-White	Moly-C-Alloy No. 1	Blue Devil 85
E 7011	A. C. only			Black-White		
E 7012	Electrode neg. D. C. Also A. C.			Blue-Grey		
E 7020	Electrode neg. for fillets, pos. for flats; also A. C.	Airco No. 94	Arc-Craft 70	Blue-Grey	*Moly-C-Alloy No. 2	*Red Devil 75
E 7030	Electrode pos. D. C., or with A. C.	Airco No. 94		Blue-Red		*Red Devil 75
E 8010	D. C., electrode pos.		Arc-Craft Moly	(Makes several types of tool steel, high speed steel. Stellite and die steel rods also.)		Blue Devil 85 E9010 & E10010 Blue Devil 100
Other High Tensile Types						

* Approved by Navy Department. Many manufacturers omitted designating such qualification.

Full Addresses of Manufacturers

Air Reduction Sales Co.
60 East 42nd Street,
New York, N. Y.

Allied Weld-Craft, Inc.
401 West South Street,
Indianapolis, Ind.

American Agile Corp.
5806 Hough Avenue,
Cleveland, Ohio

Anthony Carlin Co.
2717 East 75th Street,
Cleveland, Ohio

Champion Rivet Co.,
East 108th & Harvard,
Cleveland, Ohio

General Electric Co.
Schenectady, N. Y.

Harnischfeger Corp.
4400 West National Avenue,
Milwaukee, Wis.

Hobart Brothers Co.
Troy, Ohio

Hollup Corp.
4700 West 19th Street,
Chicago, Ill.

Lincoln Electric Co.
12818 Coit Road,
Cleveland, Ohio

Marquette Mfg. Co., Inc.
409 Northeast Johnson Street,
Minneapolis, Minn.

TABLE I—Continued

Comparable Arc Welding Electrodes for Steel

A. W. S. Class No.	Description	Trade Designations Used by Various Manufacturers					
		General Electric	Harnischfeger	Hobart	Hollup	Lincoln	Marquette
E 4510	Wire with coating applied before drawing	L			Type No. 30XL		Sulcoat
E 4511	Wire with light coating applied after drawing	F			Type No. 30S	Stable-Arc Kathode	Dustcoat
E 4520	Wire with coating applied before drawing	W-3			Type 30XL		
E 4521	Wire with light coating applied after drawing	W-4			Type 30S		
E 6010	Heavy coating, D. C. Electrode positive	W-22	*AP	*No. 55	Sureweld B	*Fleetweld 5	Type 151 Type 31-DR
E 6011	Heavy coating, A. C.	W-26			Sureweld F		Type 151
E 6012	Heavy coating, D. C. or A. C., electrode neg.	W-20 & W-30	PF	No. 77	Sureweld N	*Fleetweld 7	Type 151 Type 25-ADS
E 6013	Heavy coating, A. C. usually	W-25	Harcraft		Sureweld C	Transweld	Type 151
E 6020	Electrode neg. for fillets; pos. for flats A. C. also	W-24	*D-H2		Sureweld F	*Fleetweld 9 Fleetweld 11	33-ADS
E 6030	Electrode pos. on D. C. Also A. C.	W-23	*D-H2		Sureweld A	*Fleetweld 9	
E 7010	D. C., electrode pos.	W-52			Sureweld MLY	*Shield Arc 85	
E 7011	A. C. only				Sureweld N		Type 151
E 7012	Electrode neg. D. C. Also A. C.						
E 7020	Electrode neg. for fillets, pos. for flats; also A. C.	W-54			Sureweld F		
E 7030	Electrode pos, D. C., or with A. C.				Sureweld MLY-A	Fleetweld 9-HT	
E 8010	D. C., electrode pos.						
Other High Tensile Types						E 10010- *Shield Arc 100 E 10012 Planeweld 1	

* Approved by Navy Department. Many manufacturers omitted designating such qualification.

Full Addresses of Manufacturers

McKay Co.
York, Pa.

Reid-Avery Co.
Dundalk, Md.

Standard Steel & Wire Co.
Bolivar, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Metal & Thermit Corp.
120 Broadway,
New York, N. Y.

Joseph T. Ryerson & Son,
P. O. Box 8000A,
Chicago, Ill.

Una Welding, Inc.
1615 Collamer Avenue,
Cleveland, Ohio

Wilson Welder & Metals Co.
60 East 42nd Street,
New York, N. Y.

Page Steel & Wire Division
American Chain & Cable Co.,
Monessen, Pa.

A. O. Smith Corp.
Milwaukee, Wis.

Universal Power Corp.
4300 Euclid Avenue,
Cleveland, Ohio

TABLE I—Continued
Comparable Arc Welding Electrodes for Steel

A. W. S. Class No.	Description	Trade Designations Used by Various Manufacturers					
		McKay	Metal & Thermit	Page	Reid-Avery	Ryerson	A. O. Smith
E 4510	Wire with coating applied before drawing	21		Page B-Special	Raco *Type D *Blue Label		
E 4511	Wire with light coating applied after drawing	2					
E 4520	Wire with coating applied before drawing	3			*Type D *Blue Label		
E 4521	Wire with light coating applied after drawing	3					
E 6010	Heavy coating, D. C. Electrode positive	*15	Vertex	*Hi-Ten C	*H-D No. 7	No. 215	SW-10
E 6011	Heavy coating, A. C.		Alternex				SW-15
E 6012	Heavy coating, D. C. or A. C., electrode neg.	17 & 116	Genex	Hi-Ten F & G	H-D No. 8	No. 217	SW-11
E 6013	Heavy coating, A. C. usually	116 & 117	Alternex	Hi-Ten F & G	H-D No. 8		
E 6020	Electrode neg. for fillets; pos. for flats A. C. also	16	Type F Type FHP		*H-D No. 6		SW-35
E 6030	Electrode pos. on D. C. Also A. C.	16	Cresta		*H-D No. 5		SW-20
E 7010	D. C., electrode pos.	15 High Tensile			H-D No. 74		SW-75
E 7011	A. C. only		Alternex				
E 7012	Electrode neg. D. C. Also A. C.		Genex				
E 7020	Electrode neg. for fillets, pos. for flats; also A. C.		Type M Carbon Moly .50		*H-D No. 64		SW-73 SW-76
E 7030	Electrode pos. D. C., or with A. C.		Carbon Moly .80		*H-D No. 54		SW-73
E 8010	D. C., electrode pos.						SW-95 (E9010)
Other High Tensile Types			Cromansil (E9020 & E9030) Nickel Steel (E8020 & E8030)		Also one stainless rod, Raco 25-20, and three armorplate rods.	Ryerson sells McKay stainless electrodes.	SW-96 (E10010) SW-101 (E10020)

* Approved by Navy Department. Many manufacturers omitted designating such qualification.

Full Addresses of Manufacturers

Air Reduction Sales Co.
60 East 42nd Street,
New York, N. Y.

Allied Weld-Craft, Inc.
401 West South Street,
Indianapolis, Ind.

American Agile Corp.
5806 Hough Avenue,
Cleveland, Ohio

Anthony Carlin Co.
2717 East 75th Street,
Cleveland, Ohio

Champion Rivet Co.,
East 108th & Harvard,
Cleveland, Ohio

General Electric Co.
Schenectady, N. Y.

Harnischfeger Corp.
4400 West National Avenue,
Milwaukee, Wis.

Hobart Brothers Co.
Troy, Ohio

Hollup Corp.
4700 West 19th Street,
Chicago, Ill.

Lincoln Electric Co.
12818 Coit Road,
Cleveland, Ohio

Marquette Mfg. Co., Inc.
409 Northeast Johnson Street,
Minneapolis, Minn.

TABLE I—Continued

Comparable Arc Welding Electrodes for Steel

A. W. S. Class No.	Description	Trade Designations Used by Various Manufacturers				
		Standard Steel	Una	Universal Power	Westinghouse	Wilson Welder
E 4510	Wire with coating applied before drawing	Std. B Prescote		Staidarc B	Flexarc Grade 18	No. 17 Sulcoat
E 4511	Wire with light coating applied after drawing	Std. Dipcote	Una 160	Staidarc G		Nos. 18 and 19 Dipped Coat
E 4520	Wire with coating applied before drawing	Std. B. Stablecote				
E 4521	Wire with light coating applied after drawing		Una 160 Una 156			
E 6010	Heavy coating, D. C. Electrode positive	Greyhound Type R		Hevi Koat RP	*Flexarc AP	No. 98N 98N V & O
E 6011	Heavy coating, A. C.	Greyhound Type RC		Easy weld C2		No. 530
E 6012	Heavy coating, D. C. or A. C., electrode neg.	Greyhound Type S	UA 49 & UC 49 (Automatic)	Hevi Koat SP2	Flexarc FP & SW	No. 107
E 6013	Heavy coating, A. C. usually	Greyhound Type S	UC 49 (Auto.)	Easy weld C2	Flexarc FP & SW	No. 520
E 6020	Electrode neg. for fillets; pos. for flats A. C. also			Hevi Koat FF	*Flexarc DH	No. 105
E 6030	Electrode pos. on D. C. Also A. C.		UB 159 (Auto.)	Easy weld C2	*Flexarc DH	No. 851
E 7010	D. C., electrode pos.			Hevi Koat HT		Alloyrod A
E 7011	A. C. only					
E 7012	Electrode neg. D. C. Also A. C.				Flexarc FP & SW	
E 7020	Electrode neg. for fillets, pos. for flats; also A. C.					Alloyrod B
E 7030	Electrode pos. D. C., or with A. C.					
E 8010	D. C., electrode pos.					
Other High Tensile Types						

* Approved by Navy Department. Many manufacturers omitted designating such qualifications.

Full Addresses of Manufacturers

McKay Co.
York, Pa.

Metal & Thermit Corp.
120 Broadway,
New York, N. Y.

Page Steel & Wire Division
American Chain & Cable Co.,
Monessen, Pa.

Reid-Avery Co.
Dundalk, Md.

Joseph T. Ryerson & Son,
P. O. Box 8000A,
Chicago, Ill.

A. O. Smith Corp.
Milwaukee, Wis.

Standard Steel & Wire Co.
Bolivar, Pa.

Una Welding, Inc.
1615 Collamer Avenue,
Cleveland, Ohio

Universal Power Corp.
4300 Euclid Avenue,
Cleveland, Ohio

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Wilson Welder & Metals Co.
60 East 42nd Street,
New York, N. Y.

TABLE II
Comparable Stainless Steel Arc Welding Electrodes

A.I.S.I. Nos.	Air Reduction	Allied Weld-Craft	Alloy Rods	Arcos	Champion Rivet Co.	Crucible Steel	Harnischfeger
301X				Chromend 16/7			
302	Airco No. 204	Stain-Craft K		Chromend KS			
302B		Stain-Craft KS				Rezistal No. 2-C	
303		Stain-Craft K					
304	Airco No. 19-9					Rezistal KA-2-S	
306				Stainlend K Chromend K			
308			Arcoloy Type 308		Type 308		Harstain 18-8
309	Airco No. 25-12	Stain-Craft HC (Stain-Craft 25/12Cb)	Arcoloy Type 309 Arcoloy Type 309Cb	Chromend HC Chromend 25/12 Cb Stainlend HC	Type 309 Type 309-CB	Rezistal No. 3 Rezistal No. 3CB	Harstain 25-12
310		Stain-Craft HCN (Stain-Craft 25/20Cb)	Arcoloy Type 310	Chromend HCN Chromend 25/20 Cb Chromend 25/20 Mo	Type 310	Rezistal No. 7	*Harstain 25-20
311		Stain-Craft HN		Chromend HN		Rezistal No. 4	
312				Chromend 29/9			
316			Arcoloy Type 316	Chromend K-Mo Chromend K-Mo-Cb	Type 316	Rezistal KA-2SMO	
317		Stain-Craft 18/8 Mo	Arcoloy Type 317	Chromend 18/8 Mo	Type 317	Rezistal KA-2SMO	
325		Stain-Craft 8/18		Chromend 18/8		Rezistal No. 2600	
329		Stain-Craft 25/3 Mo		Chromend 25/3 Mo		Rezistal No. 329	
330		Stain-Craft 15/35	Arcoloy Type 330	Chromend 15/35	Type 330	Rezistal No. 330	
347		Stain-Craft 18/8 Cb	Arcoloy Type 347	Chromend 19/9 Cb	Type 347	Rezistal KA-2-SCB	Harstain 18-8 Cb
403		Stain-Craft 12					
410			Arcoloy Type 410	Chromend 12	Type 410	Rezistal No. 12 Stainless Iron	
430		Stain-Craft 16	Arcoloy Type 430	Chromend 16	Type 430	Rezistal No. 17 Stainless Iron	
442		Stain-Craft 18		Chromend 18		Rezistal No. 20 Stainless Iron	
446		Stain-Craft 28		Chromend 28		Rezistal No. 27 Stainless Iron	
501		Stain-Craft 5M				Lo Cro 46 MO	
502			Arcoloy Type 502	Chromend 502	Type 502	Lo Cro 46 MO	
Armor Plate			Armorarc Type A Armorarc Type B Armorarc Type N	Chromang			*AW 3 A *AW 3 C

Additional Company Names and Addresses (See also Table I)

Alloy Rods Co.
501 East Prospect Street,
York, Pa.

Arcos Corp.
401 North Broad Street,
Philadelphia, Pa.

Crucible Steel Co. of America
405 Lexington Avenue,
New York, N. Y.

Maurath, Inc.
7300 Union Avenue,
Cleveland, Ohio

TABLE II—Continued
Comparable Stainless Steel

A.I.S.I. Nos.	Lincoln	Marquette	McKay Ryerson	Maurath	Metal & Thermit	Smith	Universal Power	Wilson Welder
301X								
302			18-8		Murex 18-8 Murex 18-8 Mo		Stainarc A	
302B				Type 302-B			Stainarc F	Wilson No. 504
303			18-8 S					
304	*Stainweld A	Stainrod 18/8	18-8 Type 304	Type 304			Stainarc A	Wilson No. 19-9
306								
308			18-8			SW-162		
309	Stainweld B		25-12	Type 309 Type 309 Cb		SW-166 SW-167 (309 Cb)	Stainarc G (309 Cb) H	Wilson No. 25-12
310	*Stainweld D		25-20	Type 310	Murex 25-20	SW-159	Stainarc L	
311				Type 311			Stainarc I	
312								
316	Stainweld C		18-8 Mo	Type 316 Type 316 Cb		SW-160	Stainarc C (316 Cb) E	
317	Stainweld C		18-8 M o	Type 317		SW-161	Stainarc D	
325								
329				Type 329			Stainarc S	
330			35-15					
347			18-8 Cb	Type 347		SW-157	Stainarc B	
403			12% Chrome			SW-153 (405)		
410			12% Chrome	Type 410			Stainarc M	
430			16% Chrome	Type 425 Type 430		SW-154	Stainarc O Stainarc U	
442			18% Chrome	Type 442			Stainarc P	
446				Type 446			Stainarc R	
501			The above electrodes are sold by Jos. T. Ryerson & Son under the McKay brand.					
502						SW-151	Stainarc Z	
Armor Plate	Armorweld				Stainless Mn	SW-164		

Additional Company Names and Addresses (See also Table I)

Alloy Rods Co.
501 East Prospect Street,
York, Pa.

Arcos Corp.
401 North Broad Street,
Philadelphia, Pa.

Crucible Steel Co. of America
405 Lexington Avenue,
New York, N. Y.

Maurath, Inc.
7300 Union Avenue,
Cleveland, Ohio

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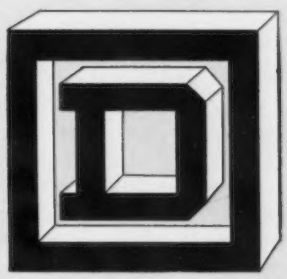
FOR EVERY TYPE OF INDUSTRIAL APPLICATION

Rain-tight Multi-breakers with a variety of circuit arrangements for such outdoor applications as lights, signs, etc. Also Multi-breakers and circuit breakers in weather and dust-tight and explosion-resisting enclosures.

Industrial Circuit Breakers in standard sheet steel enclosures are available in capacities from 15 amperes to 600 amperes, up to 575 Volts. Made in 2 and 3 poles and for 3 and 4-wire systems. These devices are quick make and quick break with trip indication.

General Purpose Circuit Breakers are made with 1, 2, and 3 poles for 230 Volts A.C. and 125/250 Volts D.C. Common trip. Available in sheet steel enclosures as well as weatherproof, dust-tight and explosion-resisting enclosures. 15 to 50 amperes.

Multi-breaker Load Centers for controlling and protecting lighting and small power circuits. Made in a variety of circuit arrangements with capacities of 15, 20, 25, 35 and 50 amperes, for either 2 or 3-wire service, with individual trip.



MO Multi-breaker for use on small machines such as drill presses, grinders, riveters, staplers, saws, beaters, etc. Available in single and double pole or for 2 and 3-wire systems. 15, 20 and 25 amperes. Price is comparable to Type D switches.

Industrial Multi-breakers are available in capacities from 15 to 100 amperes, with 2 or 3 poles. Quick make, quick break with dust-resisting sheet steel enclosures; also, explosion-resisting types. Front operated with trip indication.

Weatherproof, Dust-tight and Explosion-Resisting Circuit Breakers are furnished in cast iron enclosures with gray enamel finish. Standard conduit openings in the ends. Capacities—15 to 600 amperes up to 575 Volts.

SQUARE D circuit breakers provide quick restoration of service after short circuits or overloads. They eliminate fuses and reduce maintenance cost since no replacement of parts is necessary.

Built into every Square D circuit breaker is a time lag feature which permits harmless momentary overloads to pass without causing the unit to disconnect the circuit.

Square D's line of circuit breakers is unusually complete, assuring the right unit for any given installation.

CALL IN A SQUARE D FIELD ENGINEER

If you have a problem which involves electrical control or distribution, you're welcome to the counsel of the nearest Square D Field Engineer. He is in constant contact with plants of every kind and size. He studies methods and applications with the idea of simplifying new jobs or doing old ones better.

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SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

Assembly Line . . .

STANLEY H. BRAMS

• Reconversion plans are being sketched by auto makers . . . Reshuffling of plant layouts is likely . . . Competition on West Coast analyzed.

DETROIT—Remarks are in order about the shape of the automotive reconversion which eventually lies ahead. Discussion of the form of this second change-over is justified because automotive executives are beginning to think quite openly about the problems involved. In fact, some of the plants of the industry are planning for them in a preliminary sort of way.

The planning at this stage consists mainly of check-up on manufacturing equipment which has been stored in yards or leased to other war contractors. Inventories are being brought up to date on all such stocks and a general analysis is being made as to how long it would take to bring back leased equipment to its parent factories.

At the same time, somewhat more than casual looks are being taken at operations which have been converted to war work and in which, consequently, the way lies open for forthcoming complete rearrangement of machines, conveyors and methods. There appears little doubt but what broad relocations and revisions in operations will ensue when the war ends and a return is made to civilian production, simply because the stage is clear for such changes. This applies within plants; and it applies as between plants of individual companies as well. All passenger car makers have their work spread among several buildings, and this work was parceled out in the past mainly as a result of gradual growth, rather than logical and long range planning. The more farsighted among the automotive companies are anticipating that when the war ends and when armament equipment is removed from these shops, the reinstallation of the machines and conveyors will be along thoroughly efficient lines of planning, rather than the mushroomed sprawl of the pre-Pearl Harbor days.

At the same time some manufacturers are considerably disturbed at the possibility that all their war programs will not end at once. This viewpoint is particularly significant when the likelihood is considered that the European war will end at least a number of months before the war with Japan is brought to successful conclusion. In such an eventuality, it is generally admitted, the shape of war production in this country would take quite a different turn at the conclusion of European hostilities, with less emphasis on tanks, ground fighting requirements and other material. This would permit a partial reconversion to civilian goods in then available facilities and space.

However, in the case of companies whose operations are split between, say, Ordnance and Air Force requirements, a wind-up of much of the ground needs, with an implied or actual permission to return to civilian goods output, might mean little on reconversion if Air Force manufacturing continued to be required. The reason for this is that war work is checker-boarded throughout arms plants, there often being at least as much inter-linkage as there was in the civilian days of car and truck making. Companies faced with this situation—and there are a great many of them—feel that return to civilian goods manufacturing would be intensely difficult unless there is a near complete halt on arms output.

INTER-DEPENDENCE between plants was mentioned. It will have profound bearing in the immediate post-war picture. An automobile maker able to obtain transmissions and sheet metal and tires for his output will not be able to produce unless he can obtain upholstery also. That is to say, a successful reconversion to civilian goods manufacture will require reconversion all the way down the line—in this illustration a textile mill must return to normal operations; in some other case it may be a pinion gear manufacturer, or an oil filter maker, or a steering wheel producer. None of the auto makers are completely self-contained, far from it. As a result, one of their main concerns today in pondering the reconversion picture is whether their long strings of suppliers will also be able to convert in the short time in which they hope to undertake their return to civilian goods.

As has been well publicized, the prevailing viewpoint among the auto manufacturers is that some three months will be required before a start can be made on production of passenger cars, and that another three months or so will be necessary before volume manufacture becomes possible.

Once such output has begun, however, the general belief is that a boom market lies ahead. It is pointed out that this year and last year would have seen, on a general average, some

"BUOB": Three workers at a plant of Curtiss Wright Corp. post a banner displaying the "Back Up Our Battle-skies" theme of the newly launched production drive.

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8,000,000 cars and trucks produced. This volume has been lost, and normal wear-out of vehicles on the road today is leaving a gap which those missing 8,000,000 units could well fill. This amount, then, in the opinion of some industry executives, constitutes a very real backlog. The filling of this backlog will be the first order of business for the auto industry.

Conceivably, it could make possible the start of an era of at least a few years' length which would be a new Golden Age for the automobile industry, one in which volume would reach the 6,000,000-unit-per-year level which has never been really closely approached except by the 5,621,715 assemblies of 1929.

Although it is expected in Detroit that the tremendous volume of military airplane production will act to throttle down the aviation industry as soon as the war is over, no such situation is anticipated for the truck industry, despite the great volume of military truck production which has taken place in the past few years. The reason for this is that military trucks, first, are extremely heavy and extremely expensive vehicles from an original cost standpoint, and also, by reason of their numerous driving axles, are considerably more expensive to maintain than are ordinary civilian trucks. Furthermore, these military trucks have taken a severe beating in the field and very few of them will be in new condition when the war ends, except those immediately in process of delivery. Therefore, no overhanging threat to the truck market is expected from these quarters.

THE effect of reconversion on employment is a very real phase of the planning. This is being mulled over by the Manpower Utilization Board of the Automotive Council for War Production in one of its subcommittees, and by individual companies as well.

The concensus in this respect is that the immediate post-war period will be one in which large-scale layoffs will ensue. The first few months after civilian production is possible will be largely a period in which the factory maintenance men and the tool and die workers will alone have a brief inning. Thereafter production employment can be expected to mount as manufacturing and assembly work gets under way.

The United Automobile Workers Union is actively interested in this employment picture. Some clue as to its thinking lies in the proposal made this week by the General Motors section of the union, that the corporation set up a post-war employment stabilization fund which presumably would be used in part for maintaining workers on payrolls during the transition period.

Any discussion of post-war planning for the automotive industry must inevitably take into consideration new competition. Shipbuilder Henry J. Kaiser is developing jeeps and threatens to invade the auto industry picture. Consolidated Aircraft Corp. is interested in the picture. Lockheed officials have been approached with a view to taking over one of the small automobile company managements, a move which would seem to presage at least a loose merger. Boeing is avowedly interested in the automotive field.

Automotive viewpoint is that an automobile plant set up on the West Coast cannot function. The reason for this is that approximately two-thirds of the population and the same proportion of the nation's buying power lie in the northeastern zone bounded on the west by the states immediately west of the Mississippi River, and on the south by a line which can be drawn roughly in the immediate vicinity of the Ohio River. To survive and achieve volume an automotive company must effectively pierce this selling target. West Coast companies might compete with a cost and price advantage along the Pacific area, and perhaps as far east as the Rockies, but somewhere in the mountain area they would come into a zone of equal competition with the Michigan-centered auto companies, and farther east than that they would be handicapped by the same freight rate structure which would give them advantage on the West Coast. On top of that, they would be faced with the necessity of building dealer organizations which, in the auto industry mind, is the largest single job confronted by any neophyte to the industry.

Better, then it is believed, are their chances for success if they take over one of the smaller automobile companies now in existance in the Mid-West. Even so, of course, the dealer organization building still remains the prime job, but at least the big market would be close at hand.

Crowded Clerks In Display Space; Everywhere

Detroit

• • • **The multiplying requirements of paper work has spilled clerical staffs of automotive companies over into stores, warehouses, and display space.**

Chrysler Corp. has leased the Tuttle & Clark building in downtown Detroit for its engineering and drafting quarters.

Fisher Body Division is utilizing a vacant section of the ground floor of the New Center building. Clerical and drafting work is being done in these quarters.

Ford Motor Co. has moved several hundred desks into the rotunda facing the administration building, and more than 1500 employees of the company and of the Army Air Forces are occupying these quarters.

"TO EACH OTHER": a new motion picture featuring Walter Brennan in the first complete picture record of U. S. Steel's vast wartime expansion program and production achievements. In the film, Brennan plays the role of a veteran steel worker who has returned to the mills for the duration.

Chicago Plant Wins Plaque

Chicago

• • • **The Riverdale plant** of Acme Steel Co. has won the first place plaque in its group of the steel rolling and fabricating division competition sponsored by the Greater Chicago Safety Council.

Here's help to Avoid Delays in Production

"TROUBLE SHOOTING" Common Causes of Premature Tool Failure

Today, more than ever before, sound knowledge of "trouble shooting" is one of the essential requirements for getting the most out of your tool making facilities. Under all-out production, every care must be taken to get tools that will not fail prematurely and cause waste of skilled tool making time and interruptions in schedules. Discussed below are a few tips on "trouble shooting" that may be of help in your tool room.

Hardening Cracks—If a tool cracks in hardening, and there is nothing suspicious about the steel or the design, look at the nature of the crack. If the crack penetrates deeply—and does not parallel the length of the original bar—or if the crack shatters the piece, it may be due to one of two causes—too high a hardening heat, or placing a hard tool in a hot furnace.

In connection with this last cause, sometimes a tool does not come from the hardening just as the hardener wants it. He decides to reharden the job and throws it back into a hot furnace. This is a terrible strain on the hard tool and is likely to cause a shattered type of cracking. Since these tools cracked while still in the hardening furnace, the faces of the fracture will contain furnace scale. This definitely indicates that the tool either cracked on the first hardening—or cracked when placed in the furnace for the second hardening. Figure 1 shows the pieces of a tool that cracked in the furnace when an attempt was made to reharden it.

FIG. 1

Soft Spots—After a tool has failed, the trouble can sometimes be traced to accidental soft spots that occurred in the *wrong place*. This is the time to investigate them and take steps to either eliminate them—or to chase them back where they will do no harm.

A prolific cause for "thumb nail" checks in chipping chisels (Fig. 2) is a soft spot occurring on the bit a short distance back from the cutting edge. The crack encloses the soft spot. The cure for this trouble is to switch to a brine quench, whereupon the soft spot will disappear—and with it, the thumb nail check.

FIG. 2

Spalling—Hardening cracks that might be described as "spalling" or shelling off of corners and edges, are generally due to too low a hardening heat or to non-uniform hardening heat.

The first cause can usually be distinguished from the second by the fact that there are likely to be soft areas on the underheated portions of the tool. A tool that has been non-uniformly heated may come out hard all over or it may contain soft spots. Fig. 3 illustrates a carbon steel reamer that was hardened from a lead pot and the extreme end spalled off in quenching. This tool was not in the lead long enough for the entire tool to become uniformly heated and only the end actually got through the critical far enough to properly harden. In order to demonstrate the lack of hardness on the body of the reamer, it was sawed part way with a hack saw and then broken the rest of the way. The *spalled end*, the *"bald-headed fracture,"* and the *soft body*—all point to non-uniform underheating.

FIG. 3

FIG. 4

Figure 4 is another example of "spalled" fracture from non-uniform heating. This is an oil-hardening tool steel. One corner has spalled off and the other has cracked. While the holes appear to have played a part in the failure, they are not the prime cause. This tool was soft on the flat faces which had not been hot enough, and was file hard on the spalled corners—a clear case of non-uniform underheating.

These tips on "trouble shooting" were taken from Chapter 18 of "Tool Steel Simplified". They are only a small part of the usable information contained in one chapter of the book. Other chapters discuss every phase of tool making—heat treating, quenching, furnace atmospheres, testing, etc. Put all this helpful information to work for you—right in your tool room. Order copies for the tool room men you want to train, for those you want to up-grade to better jobs.

THE CARPENTER STEEL COMPANY, 121 BERN STREET, READING, PENNSYLVANIA

"TOOL STEEL SIMPLIFIED"

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TOOL STEELS

Washington

L. W. MOFFETT

• Iron and steel scrap situation viewed as the easiest since the United States entered the war . . . Mills are producing increased tonnages of home scrap, and yield from factories also is gaining . . . Subject of exports is military secret.

WASHINGTON—The scrap situation is the easiest since the United States entered the war. At present inventories of purchased old material in the hands of consumers and suppliers aggregate about 5,500,000 gross tons. The monthly consumption of purchased scrap is approximately 1,900,000 tons. This means that there is an inventory of almost three months. Because of the heavy drains that are to be made on scrap requirements this is a gratifying condition. At the same time, well-advised warnings have been sounded by Government sources against the development of a sense of false security. In these times the importance of building up scrap stocks cannot be over-stated.

Giving a more comfortable position to the supply situation is the fact that steel mills are producing increased tonnages of home scrap as they get into full production of war material with a resultant rise in the proportion of alloy scrap. The degree of this ratio gain is evidenced by the fact that the average scrap yield from the ingot is 33 per cent compared with an average of 25 to 30 per cent in times of ordinary production. Further easing of the scrap situation comes from the greater production of pig iron, which has caused a slight decrease in the demand for purchased scrap.

THIS year it is expected that production of industrial or prompt factory scrap may be between 14,000,000 and 15,000,000 tons. This would be an increase of some 3,000,000 to 4,000,000 tons over 1942 production but almost 50 per cent of this year's prompt scrap will be turnings which mills are having difficulty using. Turnings charge light and large quantities are contaminated with alloys. This slows down production. Because of this contamination the necessity of adjusting steel analyses is being considered.

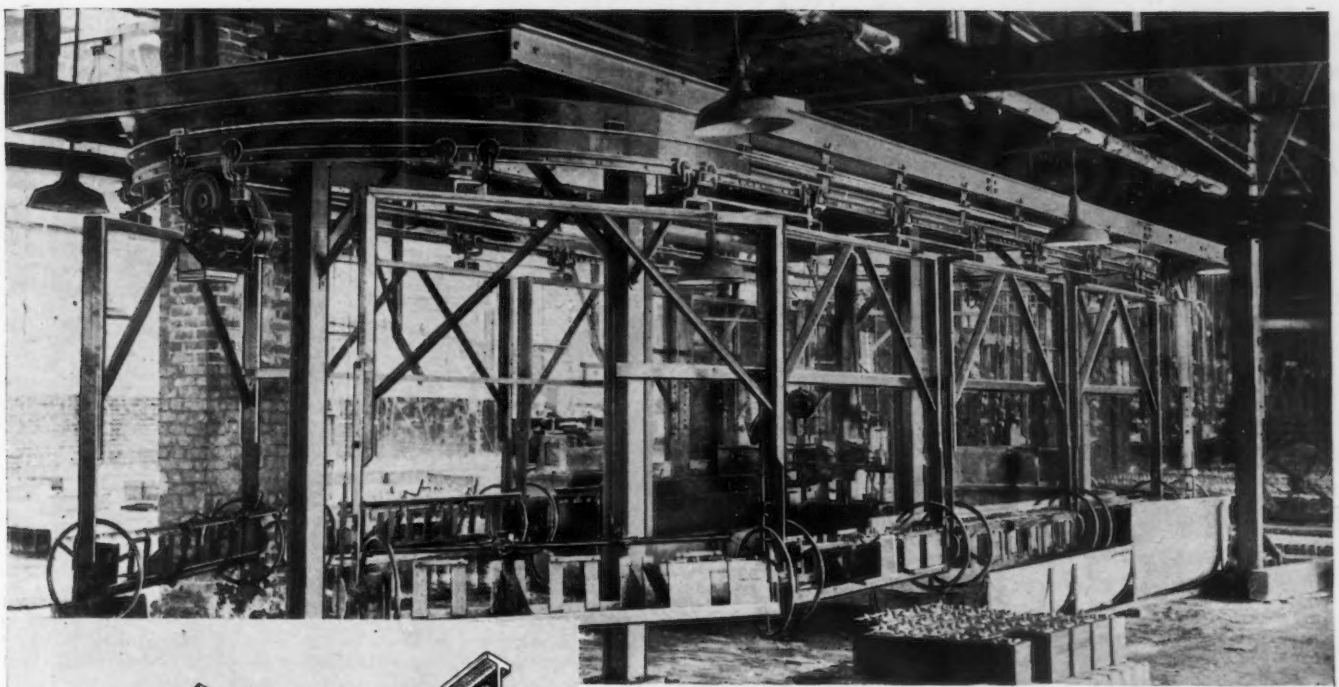
There are some mills that are not as plentifully supplied as they would like to be and while the overall picture is bright there are two outstanding immediate reasons for stocking up, aside from being ready now for the pull on supplies in the future when conditions will be less propitious than they are at present. These two immediate reasons center around a labor shortage including (1) the draft and (2) the raiding of scrap yard labor by the war plants with their higher pay. Already many yard dealers have had to curtail activities because of labor shortage and the loss of men, principals in some cases, who have been taken in the draft. Many dealers are not able to operate all of their trucks and, consequently, are not going out after scrap in their normal way. Also a matter for caution is that the lake ore season got a late start owing to cold weather and ice, foreshadowing the possibility of less pig iron production than has been estimated, a situation made worse by the lag in blast furnace expansion. This would mean that scrap would be less plentiful by fall than it is now.

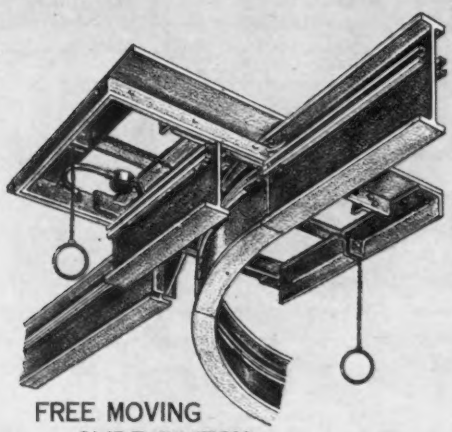
Meanwhile there are a number of mills that are wholly or partly out of the scrap market. There are instances where they are out of the market, not because they would not like to purchase scrap, but by reason of WPB requests that they stay out of the market in order to permit other mills not so well supplied, to build up their stocks.

THERE are reports that considerable tonnages of scrap are being exported. This would be an unusual movement under the existing changed conditions and one that would be difficult to understand. Government officials, considering this subject one of the numerous "military secrets," are close-mouthed about exports, except of a general nature. Nevertheless, reports of sizable exports of scrap are not given any weight. There are some small movements of scrap to Mexico and Canada. Shipments to Mexico consist chiefly of No. 2 bundles for copper precipitation plants along the border while exports to Canada are said to be of a miscellaneous character, principally for steelmaking.

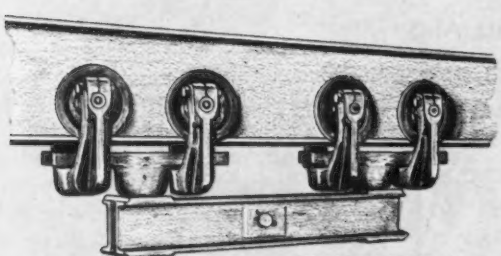
Ingot and rolled steel exports are

SHEPHERD DOG: Patrol vessel hitting the water at yards of Pullman Standard Car Mfg. Co. The Navy calls these ships "busy shepherd dogs of the sea."

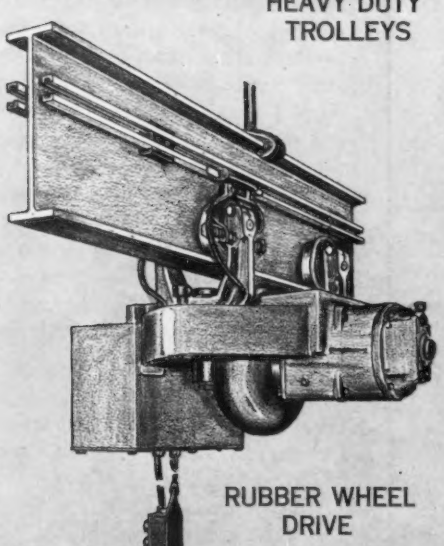




FREE MOVING
GLIDE SWITCH



HEAVY DUTY
TROLLEYS



RUBBER WHEEL
DRIVE

Extreme Flexibility

OFFERS VERSATILE APPLICATIONS

DON'T let your handling problems impede your war efforts. The production front is all important. But, even NOW you can keep your eye on the future—that post-war period that presents another conversion problem.

American MonoRail Overhead Handling Equipment is extremely flexible. It offers versatile application without costly adjustment or lengthy engineering. Standard parts fit quickly into complete systems.

Equip now for Victory—prepare now for later changes.

Let our engineers show you results obtained in hundreds of installations.

WRITE FOR Blue Book illustrating hundreds of MonoRail installations.

THE AMERICAN MONORAIL CO.

13103 Athens Avenue — Cleveland, Ohio

★

said to be less than formerly. This would mean that more scrap would be kept here. But supplies of material for fighting forces are proving adequate as shown by results on the battle fronts. Only recently stories have come out from official sources that Russia is getting American equipment in such abundance that it is piling up at ports, accumulating faster than it can be taken away by the facilities at hand. There are, however, demands for more steel for shipment abroad to unnamed countries. These demands are not being entirely filled. This was made clear by H. G. Batcheller, WPB Steel Division Director, in the course of a recent address he made in Cleveland. He was referring to requirements asked for by Lend-Lease and the Bureau of Economic Warfare. Lend-Lease protested that it was not allocated the quantity it asked for and said it would not have made the protest "if we were not convinced that the un-named country's needs for steel should be met." BEW was more outspoken and wrote the Steel Division that "The recommended allocation of carbon steel is inadequate to meet the strategic objectives of the Board of Economic Warfare."

But it is characteristic of each Government agency to magnify the importance of its own needs and this probably is true of most claimant agencies, some of which in the past at least have greatly inflated their requirements. That probably is the practice at present and leads many to believe that the steel supply picture is not so dark as it has been painted. Nevertheless, production and more production is necessary as a matter of assurance but it also is necessary to have a well-balanced distribution.

PRESS CONFERENCE: The new "boss" of the soft and hard coal mines, Harold L. Ickes, tells the press that the collective bargaining situation between the nation's mine operators and the UMW remains the same. The difference now is that the miners are back at work.

WPB Asks Daily Steel Report for Carbon and Alloy

• • • **WPB Steel Division** Director H. G. Batcheller ordered all steel producers last Saturday to make a daily report of accepted orders. The report applies to all carbon and alloy steel except steel castings and is effective for orders accepted after May 15.

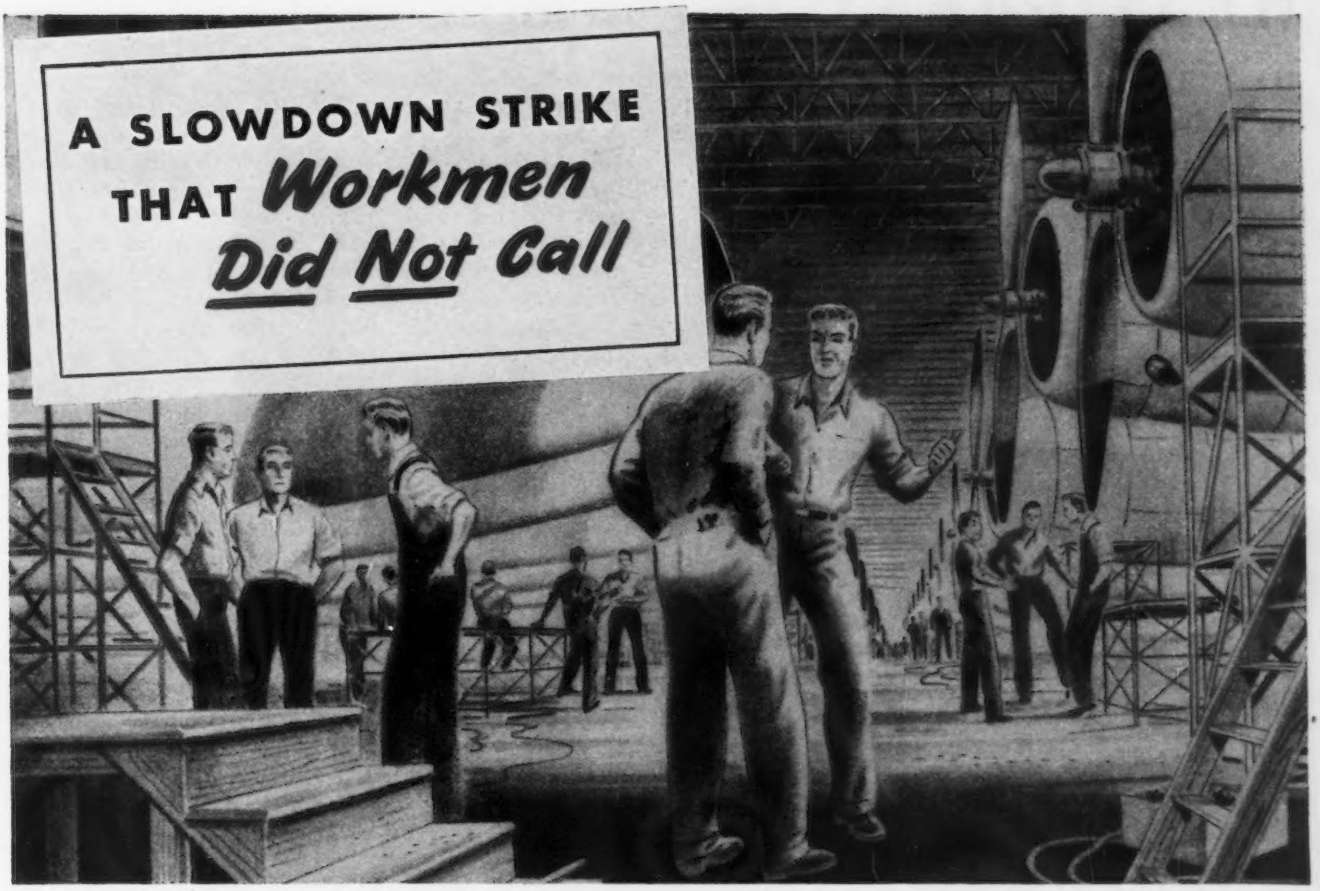
The report form which has not been designated with a number as yet provides for the listing of accepted orders by name of customer; claimant agency and major program symbol; month; steel product code number; and weight. Producers may report all orders in the detail provided on the report form or report only orders for stainless and tool steel which amount to 500 lb. or more for any one program for delivery in one month and orders for each steel product other than tool and stainless steel which amount to five tons or more for one program for delivery in one month. If the producer elects to report in detail only those orders equal to or in excess of the minimum tonnages, orders for less than the minimum tonnages should be reported in total by product code number and month number. Track accessories producers may make monthly reports.

Mr. Batcheller also requested producers to file a special report of authorized controlled material orders for carbon steel (including wrought iron) and alloy steel except steel castings, accepted before May 16. The report must be filed on or before May 25.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THERE'S CORNMEAL, BARLEY OR OATS IN THIS BALONEY, LIVERWURST OR MINCED HAM! WHY, THEY'RE EVEN USIN' THE PIG'S SQUEAL! LOOK AT THE AIR HOLES IN THIS SAUSAGE!
OH, I DON'T MIND 'EM PUTTIN' OATMEAL IN MY HAMBURGER, BUT I DON'T WANT HAMBURGER IN MY OATMEAL!
WHAT THERE'S A SHORTAGE OF, YOU'LL FIND IN WHAT THERE'S ANOTHER SHORTAGE OF!
5-14
MYSTERIES OF LIFE
J.R.WILLIAMS
COPR. 1943 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

A SLOWDOWN STRIKE THAT *Workmen Did Not Call*



Assembly stopped—men waiting—precious hours lost. This slowdown wasn't called by workmen—nor was it sabotage.

A run of parts that wouldn't fit caused the stoppage. It could have been prevented by an adequate gaging policy and inspection practice.

Parts that don't fit cause losses in production, wasted man hours, excessive scrap and rework time that are many times what *adequate inspection* would have cost.

★ ★ ★

Sheffield, authorities in Dimensional Control, can help you formulate a sound gaging policy whereby you can gage 100% of your product at a cost insignificant in comparison to the expense of not doing it.

★ ★ ★

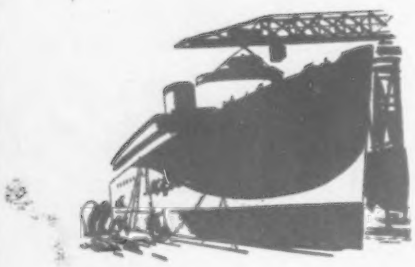
THE SHEFFIELD CORPORATION

DAYTON, OHIO, U.S.A.

Specialists in Dimensional Control

WEST COAST . . . OSGOOD MURDOCK

• North American Aviation probes employee views . . . Kaiser starts steel production Friday . . . Lockheed notes improved material situation.



LOS ANGELES — Not so many years ago, the opinion held by employees of North American Aviation's Inglewood plant of the company's management was no great secret. One of the bitterest strikes ever faced by any manufacturer in southern California culminated by the locally famous "battle of the bean field," put North American's struggle with the then infant CIO aircraft organization on the front pages of every newspaper in a nation rapidly becoming more war conscious.

This year, however, North American's wages, along with those of other West Coast airframe manufacturers, were settled by edict of the federal War Labor Board, and President J. H. "Dutch" Kindelberger had to pass out questionnaires among his employees to be sure what they thought of the company and its management.

As a matter of strict fact, this was the second year in which employees both at the Inglewood and Dallas, Texas, North American plants had an opportunity to express their views through questionnaires and gripe sheets. The questions asked at both plants were identical.

At Inglewood 65.25 per cent of the handful of employees who returned the questionnaire felt that the top management was competent, but 16 per cent were definitely of the opinion that it was not. The skeptical Texans, who did not have the spectre of a bitter strike in their background endorsed the competence of top management by only 57.30 per cent, but less than 11 per cent were definitely of the opinion that the show was being fudged. Less than 60 per cent at Inglewood felt the top management was sincere, and less than one-third felt it was interested in them. Only 56.51 per cent of the Texans thought the brass hats were sincere, but, being of a folksy nature, more than 35 per cent thought the front office was interested in them. At Inglewood, 44.76 per cent were definitely of the opinion that the top management was not interested in them.

North American planes have played spectacular roles. The B-25 bombers, besides being constantly in the news from overseas, were used in our raid on Tokio. The AT-6 trainer has been particularly satisfactory in the advanced schools. The North American Mustang is still winning ecstatic notices in the "new goods" column. Yet, less than two-thirds of the workers answering the questionnaire felt the majority of their fellow employees were competent; 68 per cent, sincere; and 45 per cent, doing their best. Less than half of the Dallas workers felt the majority of their fellows were competent; 57 per cent, sincere; and 45 per cent, doing their best.

KINDELBERGER also asked his workers what they thought their chances of continued employment with the company were after the war. At Inglewood, 17.99 per cent expected to be laid off at the end of the war; 9.73 per cent planned to return to their former businesses; 33.48 per cent hoped the company would need their services, "but had some doubt"; and 39 per cent expected the company would continue to need their services and intended to stay on the job. More optimistic were the Texas workers. Only 10.70 per cent expected to be laid off after the war; 9.10 per cent planned to return to their former businesses; 33.60 per cent hoped, but doubted, that NAA would still want them; and 44.55 per cent expected they would be needed and intended to stick.

On the matter of morale, only 1.64 per cent of the Texans felt that speeches by company or government officials could accomplish most, and only 2.34 per cent of the southern California employees wanted to listen. Some of the fondest illusions of the Office of War Information were blasted—only 3.68 per cent of the Texas and 6.47 per cent of the California workers felt exhilarated by combat stories of North American planes in action; only 1.84 per cent of the Californians and 3.24 per cent of the Texans were spurred by true stories of persecution from conquered countries; only 2.38 per cent at Ingle-

FRESH FOOD: Service men thousands of miles from grocery or meat stores are assured fresh food by portable refrigerators. Installation of interior coils and refrigeration system is shown above at the Weber plant, Los Angeles.

AND SHE NEVER HEARD OF *Torque*

The old oaken bucket, for all its romance, was a heavy load to pull out of a well. The pioneer woman knew the crude windlass made it possible for her to accomplish the task, but though she used it daily she never knew the meaning of torque conversion.

To control the tremendously concentrated power of today's engines calls for accurate appraisal of the forces involved, precise manufacture of the devices themselves, and intelligent application of long experience. That's why Twin Disc Clutch Company, for 25 years, has devoted itself exclusively to this one specialized field: the design, manufacture and application of industrial clutches and hydraulic drives.

From small machine tool clutches to large power take-offs for heavy oil rigs, from rugged, quiet running marine gears to hydraulic torque converters for rail cars, cranes and logging machinery, from clutches for light farm tractors up to heavy duty models for earth-moving monsters—in all these fields Twin Disc is known as the name that means top performance and dependability.

If you are planning a new product requiring connection between driving and driven parts, or if you are seeking to improve an old one, consult with us now, while you are still in the design stage. Our engineers can help you select and apply exactly the right clutch from our broad and varied line of standard manufacture. Not only will you improve the performance of your new product, but you will very likely reduce its cost as well. TWIN DISC CLUTCH COMPANY, Racine, Wisc.

Twin Disc Hydraulic Torque Converters★ permit smoother and faster operation of machinery handling tremendous weights of pipe and tools in drilling oil wells thousands of feet deep.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

wood and 2.51 per cent at Dallas heeded posters urging greater efforts. On the other hand, only 1.35 per cent at Dallas and 4.32 per cent in California felt shorter hours of work and additional conveniences would build morale, and 43.19 per cent at Dallas and 17.22 per cent in California felt longer hours of work and less coddling would be stimulating. Lack of material was blamed by 8.42 per cent at Dallas and 11.2 per cent at Inglewood as the chief morale destroyer, while 19.07 per cent at Dallas and 33.46 per cent at Inglewood said that all the truths about our defeats as well as our victories would do more than any other single factor toward building the will to work to win.

Shortage of materials was agreed upon as the most serious problem Dallas North American had to overcome by 26.58 per cent of the workers; 25.37 per cent thought it was inadequate personnel; and 16.85 per cent listed absenteeism. Of the Inglewood workers, 27.37 per cent thought the company should worry about inadequate retrained personnel most; 22.98 per cent, shortage of materials; 18.33 per cent, absenteeism.

JUST four and one-half months after the lone 1200-ton blast furnace was blown in at the Fontana works of Kaiser Co., Inc., steel production will start Friday in the open hearth department. Finished steel production is still several months away, due principally to delayed delivery in heavy material handling equipment.

No words could better indicate just how new and mysterious steel production is to the West Coast than the description printed by the Los Angeles Times, generally acknowledged to be the Coast's leading newspaper, concerning the inauguration of raw steel production:

"Steel will issue for the first time May 14 from Henry Kaiser's giant new blast furnace at Fontana.

"On that day before employees of the West Coast's first steel mill the industrial wizard will open the hearth to pour the first steel ingots produced since the plant began operation.

"The blast furnace was 'blown in' on Dec. 30, 1942. Two days later the first pig iron to be cast on the West Coast was poured. Now, with that pig iron, plus scrap and certain raw material, the furnace will spew forth steel."

There is nothing funny, however, from the Kaiser point of view in charges of unfair labor practices filed with the National Labor Relations Board against the company by CIO steel workers Local 2861, which claims to have signed up 85 per cent of the plant's production workers. The CIO group two weeks ago filed for NLRB certification as bargaining agent, but an AFL unit promptly filed an intervening petition.

Ever since the long established Kaiser policy of establishing union relationships in the early stages of any project ran afoul of a snag when CIO objected to Kaiser's early bird agreement with AFL at Portland, the CIO has been on the trail of all Kaiser plants snapping viciously at their employee relationships whenever possible. The Permanente Metals Corp., Kaiser magnesium subsidiary, currently has a case before the WLB as a result of charges by CIO laboratory workers that production was deliberately hindered. Every conceivable opportunity is taken by the CIO and radical press to drag down the Kaiser prestige generally.

LOCKHEED is tooling for a large production program on its big Constellation transport, will deliver several this year, and will go into steady production early next year, Robert E. Gross, Lockheed president told stockholders last week. Moreover, Lockheed's subsidiary, Vega, built more B-17 Flying Fortresses during April than in the last seven months of 1942, indicating that its agreement with Boeing is actually bearing fruit after long delay.

Need for Motive Power by Carriers Now Reported More Serious Than Ever

Pittsburgh

• • • **The locomotive** situation reported previously as serious has now reached a point where railroads frantically are in need of new deliveries on locomotives. Hauls are much longer, trains are longer, freight cars are in most cases loaded to the maximum, deliveries of new locomotives are behind schedule and service failures are increasing. Locomotive builders can't do much better than they are doing because they are having pressure put on them to complete as rapidly as possible motive power for Lend-Lease and the Army. This throws back deliveries to domestic railroads.

Steel to complete the balance of the 20,000 domestic freight cars which were approved for the first six months will have to come out of the third quarter railroad requirements. Emphasis has also been on the building of close to 41,000 freight cars for the government. Work on the 20,000 domestic freight cars has been retarded because steel for troop cars and kitchen cars, which are being financed by the DPC, has been included in the ODT allotment.

The WPB, it is understood, is putting pressure on for more rails—both for Lend-Lease and domestic carriers.

MOST LEND-LEASE PLANES HAVE GONE TO RUSSIA, BRITAIN AND AFRICA
U.S.S.R.
UNITED KINGDOM
AFRICA
AUSTRALIA, N.Z., CHINA AND INDIA
OTHER AREAS
EACH SYMBOL REPRESENTS 5% OF ALL TACTICAL PLANES EXPORTED UNDER LEND-LEASE

X-14839

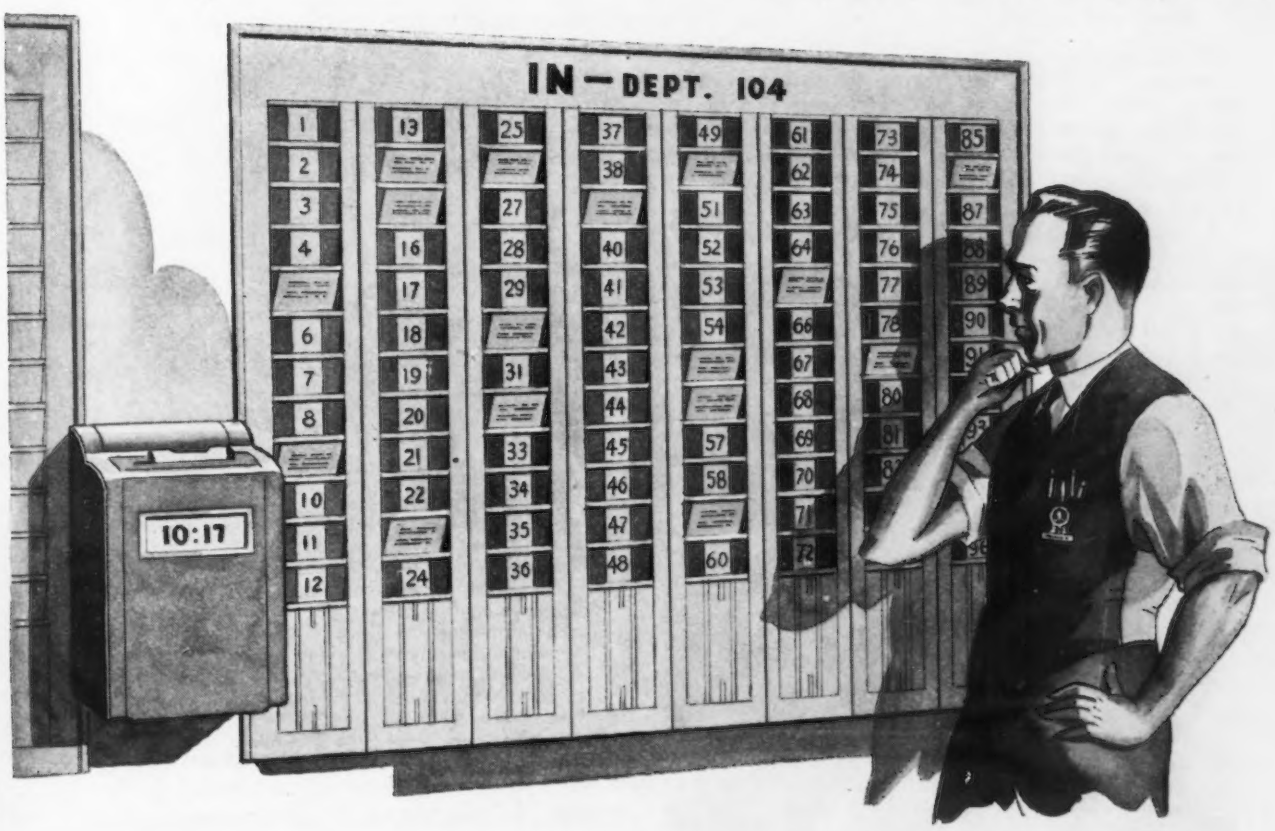
REDUCE ABSENTEEISM

BY USING VICKERS HYDROMOTIVE CONTROLS

Studies of absenteeism have disclosed that fatigue is an important factor . . . particularly with older workers and with women. Machines which require much muscular effort or a series of complex operations for their control tire these workers to the point where they find extra rest necessary.

Machines equipped with Vickers Hydromotive Controls help reduce absenteeism from this cause. Operation of such machines is easy . . . a touch of the finger—a flip of the wrist. Fatigue arising from the need of nervously close attention is eliminated too. Much of the required skill is built into the machine. Complex operations can be reduced to simple routines—or can be made automatic. Controls can be interlocked so it is impossible to do the job wrong. Exact load limitations can be applied so the machine cannot be overloaded.

A Vickers Application Engineer will gladly discuss "hydraulics" in connection with your machines.



VICKERS *Incorporated* • 1420 OAKMAN BLVD. • DETROIT, MICHIGAN

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • ROCKFORD • TULSA • WORCESTER

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CONSTANT DELIVERY PUMPS | CONTROL ASSEMBLIES | FLUID MOTORS | VARIABLE DELIVERY PUMPS | DIRECTIONAL CONTROLS | PRESSURE CONTROLS | VOLUME CONTROLS

Fatigue Cracks

BY A. H. DIX

"Moore" Completes 90-Day Anneal

• • • You have been informed here of the progress of Alfred Yerden, alias A. Moore, the midwestern Robin Hood who represented himself as authorized to accept subscriptions for your favorite family journal and other industrial publications, and who pocketed the money paid him for those bogus subscriptions.

Alfred's career was halted on Feb. 13 by a 90-day jail sentence, to the relief of some and the dismay of others. Poet laureate of the latter group, which holds that virtue can be tiresome in straight doses, is Donald (Lancaster Carbon Co.) White, who pleads:

How closely I followed this gentleman's rise
And each week's edition did scrutinize,
For more about IRON AGE'S *troublesome burden*
Occasionally known by the name of A. Yerden.

Oh please let him out to return to his trades
So I can quit boring myself with charades,
I'm disgusted with life that holds nothing in store
With further adventures of our friend Mr. Moore.

We are happy to inform Mr. White that today Alfred is returned to circulation, having completed his three-month term. Thus he has paid his debt to society, even though certain midwestern manufacturers are still out sums ranging from $10 to $37.

Whether his 90-day anneal in the Detroit House of Correction has relieved him of his anti-social stresses and strains, we do not know. Perhaps he has resolved to tread the dull path of righteousness. He may have destroyed the receipt forms he had printed, bearing the name of the fictitious "Publishers Service Bureau, 428 Fifth Ave., New York." Again it may be that he has already thought up a virgin, unsullied alias and may soon pass among you with new, grander, but still phony receipt forms. But whether Alfred calls on you as Yerden, Moore, Montague or Capulet, he is no man of ours. By refusing to give checks or cash to casual callers, you will help convince him that crime does not pay.

Alfred Yerden, alias A. Moore—suave, pleasant, persuasive —5 ft. 10 in., 155 lb.

Aptronyms

. . . If aptronyms involving a foreign language are not taboo, how about Bill Eisenmann, national secretary of the American Society of Metals? "Eisenmann" is, of course, "iron man."

—John A. Bennett, National Bureau of Standards, Washington.

Extra Ess

• • • When we ran across a subscription card marked "Sauereisen Cements Co., Pittsburgh," we thought the stencil machine had stuttered, but "Cements" is right. Fortunately, the plural in corporate titles is still rare. There is no Inland Steels Co., United Fruits Co., Bell Telephones Co., or Bethlehem Shipsbuilding Co.

We suppose there are several kinds of molasses, and we are particularly grateful to the American Molasses Co. for contenting itself with the singular, but we do not begrudge the Levy Pants Co. its plural.

Paging Philip Wallace

• • • Philip B. Wallace, Jr., filled in one of our forms and returned it without giving his address. The envelope was postmarked San Francisco. If any San Franciscan who reads this is acquainted with Mr. Wallace we will send our informant as a reward a copy of the metal gage comparator chart in the Apr. 15 issue.

Gage Maze

• • • To all others than those who send us Philip Wallace's address extra copies of the gage comparator chart cost 15c. Our own opinion of the chart is ascending rapidly. When we first saw it we thought it was merely excellent, but the ecstatic letters we are getting about it when loving readers have convinced us that this is one of the technical publishing finds of the decade.

Even though we ran off a couple of extra thousand copies, at the rate they are going they won't last long. What impresses us is the variety of right answers to the question, "How thick is a 12-gage sheet?" If it is plain steel the answer is 0.1045 in. (U. S. Standard gage, revised 1929); if it is a stainless sheet of less than 24-in. width, the thickness is 0.109 in. (Birmingham gage); if stainless of more than 24-in. width 0.1092 in. (old U. S. Standard); if Dural, 0.081 in. (American gage, Brown & Sharpe), and if sheet zinc it is 0.028 in.

The chart, as you know, enables you to convert any gage number to any other, or to thousandths of an inch, or fractions of an inch, as fast as you can run your index finger down a column.

Fifty Years Under a Cloud

. . . You reported recently that brass-clad steel is now being used for bullet jackets in place of the customary solid brass. Thus a famous (censored) is now legitimatized: the notorious "steel-jacketed bullet" of fiction has become a fact after a half century's existence as a myth.

How it started I don't know, but I suspect the publicity sense of a certain gun manufacturer, whose salesmen introduced the little thirty-thirty carbine—the first popular "high-powered" rifle—by shooting holes in the moldboards of plows in country hardware stores, in order to convince the loafers that this airgunlike weapon would "shoot through chilled steel." The old cupro-nickel bullet was white, like steel, and I suppose the stove spitters made a natural but erroneous deduction.

—Deac

We saw the new carbine, the bazooka, the latest anti-aircraft guns and other favorites in the Army's stables put through their paces recently at the Aberdeen Proving Ground. The cost of the ammunition fired off for us visiting journalists must have run into five figures.

We are only guessing at the amount as we have not the vaguest idea what a 155-mm. shell, for example, costs. But a friend of ours, who was drafted recently and who is now an M.P., said that each shell in the three-shell shotgun he uses in guarding deserters, costs 28c. He knows, because if he uses any of the shells on escaping prisoners he has to pay for them himself.

Puzzles

• • • Last week's grocer loses. The reason why he loses is quite complex. If you would like to have the solution, we will copy it from our puzzle book and send it to you.

Ninety seconds is par for this:

I am twice the age that you were when I was your age. When you get to be my age our ages will total 63 years. How old are we?

Eyes and Ears of the Fleet

You hear more of other craft than of Seaplane Tenders — but from Pearl Harbor on they've been in there . . . patrolling . . . listening . . . *fighting*. A Jap fleet moves toward the Solomons. Long before it is within range of land-based aircraft, Seaplanes from a Seaplane Tender have spotted it. From then on the officers of America's fighting forces know every move of the enemy, and what to do about it, for example, the Bismarck Sea!

To provide both propulsion and auxiliary Diesel engines for these and other important warcraft of the U. S. Navy is the assigned task of Fairbanks-Morse. It is a task of which we are proud. We feel that nothing less than our level best is good enough.

Fairbanks-Morse & Co., 600 South Michigan Avenue, Chicago, Illinois.

FAIRBANKS, MORSE & CO.

Dear Editor:

CENTRIFUGAL CASTING

Sir:

It would be appreciated if you will let us know the dates of the various articles that you have published on centrifugal castings during the past ten years.

W. G. REICHERT
W. G. Reichert Engineering Co.,
1060 Broad St.,
Newark, N. J.

• June 4, 1931; July 21, 1938; June 29, 1939; July 6, 1939; Aug. 31, 1939; Feb. 15, 1940; Aug. 8, 1940; April 1, 1943; and April 22, 1943. Other articles on centrifugal casting appear in this issue and in the May 20 issue.—Ed.

GAGE COMPARATOR

Sir:

The sheet metal gage comparator comes in very handy to us in our Engineering Department and in our various other processing departments. What would six copies cost?

J. A. HONEGGER,
Vice-Pres. and Works Mgr.
Specialties Mfg. Co., Inc.,
35 Farrand St.,
Bloomfield, N. J.

Sir:

We are very much interested in the Metal Gauge Comparator. Where can we obtain two or three copies for the use of our Engineering Department?

R. MAYO CRAWFORD,
2nd Vice-Pres.
Turner & Seymour Mfg. Co.,
Torrington, Conn.

Sir:

The Comparator insert is just fine. Could we get two or three extra reprints?

HAROLD F. COTTER
School of Chemistry Library,
University of Alabama,
Alabama

Sir:

The Comparator Chart is very interesting to us. As a matter of fact, it is the best thing of the sort I ever saw and I would like to obtain about a dozen copies. Kindly advise price.

E. S. STRANG,
Vice-Pres. and Gen. Mgr.
New Haven Copper Co.,
Seymour, Conn.

• Price of Comparator is 15¢, in stamps or coin.—Ed.

MOVABLE INDEX

Sir:

In these busy times and with numerous magazines coming over one's desk, it is irritating to say the least to have to spend unnecessary time looking for the index in a magazine. In checking the past few issues of THE IRON AGE, I find the index is on a different page in each issue. Would it not be more practical to have one definite place in the magazine for the index—preferably the first or second page—and adhere to this practice in each publication?

CLAYTON M. HOFF,
Mfg., Electroplating Div.
E. I. DuPont de Nemours & Co.,
Wilmington, Del.

• The number of advertising pages preceding the editorial section varies each week. At the same time, the editorial index page is in a fixed position with relation to the editorial section, always preceding that section by two pages. Placing the editorial index in a fixed position as to page number is not impossible but would be difficult in the case of The Iron Age because of the exceptionally brief interval between the closing of the last editorial form and the mailing of copies. This interval is fifteen hours. The editorial index is placed in a form going to press late in order to provide for proper indexing.—Ed.

ALUMINUM HEAT TREATING

Sir:

On your April 1 "Dear Editor" page, we note a request by C. H. Hopper of J. G. Brill Co. for tear sheets of the October 29 article, "Aluminum Heat Treating at Bell."

We, too, are interested in the same and would appreciate your advising where it can be obtained.

MICHAEL KIWAD
Manhattan Modeling & Chasing Co.,
185 Genesee Ave.,
Paterson, N. J.

• We are sending you a clipping.—Ed.

BURLESQUED PRIORITY FORM

Sir:

Will you please advise where I might be able to obtain a copy, or copies, of the burlesqued priority form, "Request for Information," shown on page 130 of your March 25 issue.

I handle a number of priority forms and this particular form strikes a responsive chord.

R. K. PEACOCK,
Sales Dept.
Ajax Metal Co.,
Frankford Ave. & Richmond St.,
Philadelphia, Pa.

• The form reproduced was sent us by our Washington office. We understand that it was issued by a steel company, but which one we do not know, nor do we know where copies may be obtained.—Ed.

HAMMER GIRLS

Sir:

Owing to the heavy call which Selective Service has placed on our men operators, we have been forced, within the past six months, to gradually absorb into the organization a number of girls to take over their jobs. We have found that these girls adapt themselves very well to the majority of the operations, but when Selective Service began to take our Bradley hammermen, we had no alternative but to commence training girls for hammer work.

We are now in a rather unique position where we have three girls operating these 100 lb. Bradley hammers. As we are doing 100 per cent Navy work, these tools must be turned out at very close tolerances. We find that the production of the "hammergirls" is beginning to compare favorably with some of the "old time" hammermen.

We are curious to know if we are not the first company in the United States to employ "hammergirls"?

HARRY DAVIDSON,
Asst. Manager
Steel Conversion & Supply Co.,
P.O. Box 537,
Castle Shannon, Pittsburgh, Pa.

TURNING STAINLESS STEEL

Sir:

We are in need of information concerning the turning of No. 416 stainless steel. Specifically, advice relating to cutting speeds, tool angles, and clearances necessary to obtain smooth finishes will aid us.

WILLIAM A. SCHLOSSER
Argos Foundry Co.,
Plymouth, Ind.

• See "Machining Stainless Steel," a seven-page article in the Jan. 25, 1940, issue of The Iron Age. But candidly, the best information on the subject is issued by the stainless manufacturers themselves. Most of them issued booklets showing speeds, tool angles, clearances, etc., that will give best results.—Ed.

CMP-PRIORITIES GUIDE

PLEASE SEND TWO HUNDRED COPIES IRON AGE SIMPLIFIED CMP AND PRIORITIES GUIDE. I HAVE JUST SEEN IT. THINK IT IS EXCELLENT JOB.

H. G. BATCHELLER,
Director Steel Div.
WPB,
Washington, D. C.

Sir:

We are in receipt of a copy of your CMP and Priorities Guide, and wish to compliment you on the way it is put together. We believe that it will prove very valuable to purchasing agents and others who want a brief yet complete recapitulation of CMP regulations.

We wonder whether we can get a dozen extra copies of this Guide so that each one of our purchasing agents will be provided with his own copy.

R. F. STILES,
Director of Purchases
Stewart-Warner Corp.,
1826-1852 Diversey Parkway,
Chicago, Ill.

Sir:

THE IRON AGE Simplified CMP and Priorities Guide has just arrived and we certainly want to compliment you on doing the best job we have seen on this subject. As a matter of fact, THE IRON AGE has practically become our Bible on this whole priorities question.

ELIAS WOLF,
National Metal Edge Box Co.,
Callowhill at 12th St.,
Philadelphia, Pa.

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This Industrial Week . . .

- ***War Success Outmodes Timetables***
- ***Lag in Steel Expansion Revealed***
- ***Magnesium Fabricators Being Sought***
- ***Steel Output Makes Comeback***

THE smashing success of the Tunisian campaign has made necessary new timetables, which will create a variance of demands upon the United States' metals and metalworking industries. Some of the equipment being rushed a few weeks ago no longer is so vital, while the need for other material now is more pressing. Certain programs may be telescoped and others will be enlarged. Export shipments are expected to change in some respects.

The expected new shifts dictated by military strategy are not likely to cause any serious problems overnight, however. For months, American business has been experiencing sudden changes, not only in wartime production contracts but in material procurement, manpower and other phases of industry.

Currently, the steel industry is attempting to set its house in order for the new 48-hr. week order, which will be modified; to get set for possibly another walkout at the coal mines at the end of the present truce; to continue expediting (in the face of obstacles) its expansion programs which are lagging badly; to make the new Controlled Materials Plan more workable, and to perfect operations in numerous departments where pressure for more production is severe.

THE decision of the War Manpower Commission to modify its 48-hr. week order in steel results from the insistence of the steel industry that the original plan was not practical, and comes after a serious flareup inside the WMC. At the same time within the past week some authorities discovered that "average" steel industry employment figures do not represent actual conditions because of the high rate of turnover and absenteeism being experienced. It will be almost impossible for the steel industry to average 48-hr. per employee per week, regardless of the rules that might be established.

The lag in steel expansion was brought to the fore this week by WPB Steel Division Director H. G. Batcheller who pointed out that by the end of May the open hearth expansion program will be only 29 per cent complete; the electric steel program will be 44 per cent complete, and the blast furnace program will be only 43 per cent complete. Most significant of all, and pointing to possibly the most serious bottleneck in the whole picture, was the disclosure that the by-product coke oven expansion program will be only 30 per cent complete by the end of this month.

In view of the above statistics, it is doubtful if steel ingot production this year will reach the goal of 92,000,000 net tons which was set by WPB. The industry certainly has done its best and there is no evidence that the lag can be blamed upon it.

THE struggle to eliminate the "bugs" in the new CMP seems likely to continue far into the future, for as soon as one difficulty is erased another appears. Among the hardships are those which small jobbing firms face, due to the fact they have little control over the amounts of material they can order while at the same time they cannot always obtain deliveries when desired. Improvements needed in the CMP generally are conceded to include a closer watch at Washington over specific sizes of steel, and earlier authorizations so that desired deliveries may be made. Some steel sources are strongly urging that quarterly steel requirements should be made known at least two months ahead of the beginning of the quarter and that by that time, actual specifications should be to the mills in order to eliminate "shopping around" at a time when material is actually needed. One step in the direction of assisting harried Washington officials is the order that steel producers henceforth must file a daily report of accepted orders. At the same time emphasis is needed that customers must pass allotment numbers down as speedily as possible.

Some CMP experts fear that if the number of directives issued by WPB becomes much larger than it is now, CMP can be seriously disarranged so far as steel mill schedules are concerned. Possibly a large volume of tonnage will remain unvalidated on steel mill order books after July 1 when CMP will be in full effect.

ANXIOUS to make fullest possible use of the nation's enlarged magnesium supplies, the aircraft industry is seeking to interest foundries and other fabricators in switching over to magnesium. Up to the present, the campaign's results have fallen short of the expectations of the authorities pushing it. Magnesium's reputation for being "tricky" to handle has caused some companies to hesitate or at least to study the matter at length when the step has been suggested. Nevertheless, one aircraft company alone is trying to place 40 new jobs in magnesium.

Meanwhile, secondary metals are being adopted for

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war production to an increasing extent. Even before the war started, the Navy was a big user of secondary metals, having found that parts did not suffer from corrosion. During the course of the war, secondary metal foundries have been called upon for many difficult jobs. Even the casting of airplane engine cylinder heads in permanent molds has been suggested.

Considerable interest in the aluminum melting field currently centers on the use of tilting furnaces, which are being experimented with in the hopes of obtaining improved castings. At least three firms are pushing experiments with this kind of equipment.

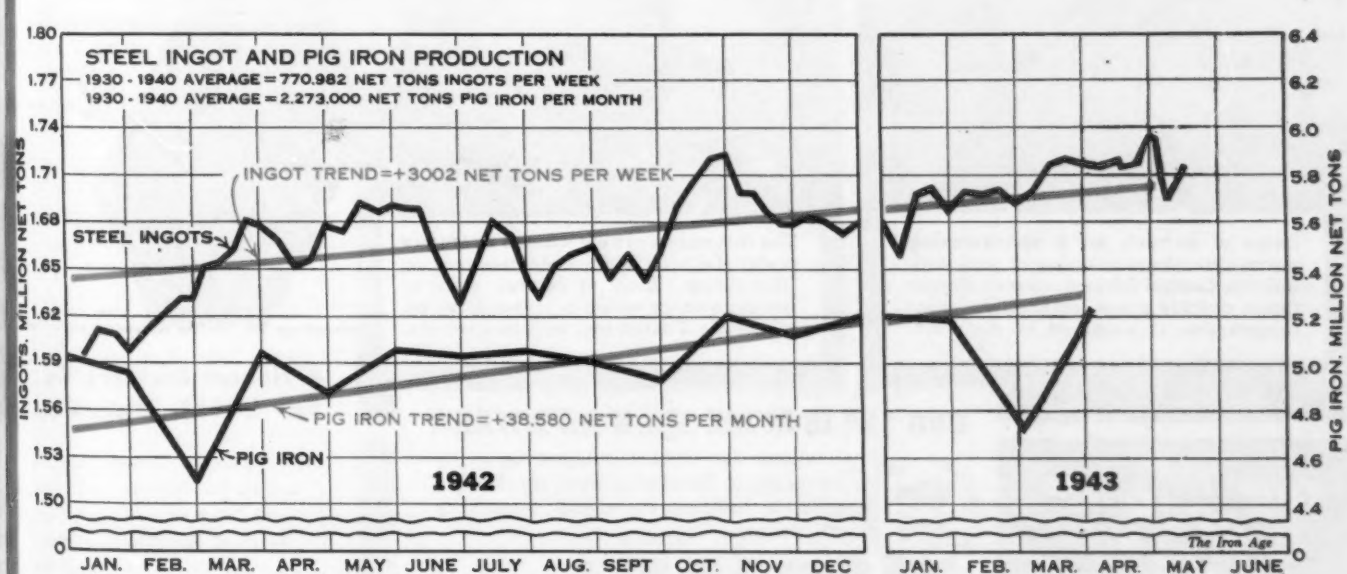
Many of the jobbing foundries in the East are reported looking for additional work now, particularly those foundries which have been engaged heavily in casting for the machine tool industry over the past two years. However, this trend has not reduced the demand for pig iron to any appreciable extent. With numerous blast furnaces being repaired, the pig iron supply picture is very tight.

THE nation's railroads desperately are seeking more motive power and more steel rails. The need for additional freight cars is said to be secondary at the moment in the opinion of some of the leading carriers. Many locomotives and cars are being built for service abroad and export shipments of rails have been heavy, while domestic railroad requirements for third quarter of this year have been pared from about 2,300,000 net tons to 1,350,000 tons.

On the subject of steel prices, the OPA is expected to issue a revised statement to take care of the 6 per cent reduction in freight rates, effective May 15. The reduction in rail freight charges sets the truck freight prices far in advance of rail freights, both for less-truckload as against less-than-carload lots; for truckloads as against carloads. Distressed steel which is reprocessed or reconverted will have a price ceiling on the service rendered in connection with such reconversion.

Difficulty has been experienced by some steel producers with regard to export sales. These sales, not included in Lend-Lease, have been held up in many cases because exporters have had licenses either revoked or suspended. One company reports that "the money for some of our sales has been in the bank in New York for as long as a year," but shipments have not been made because of the matter of licenses. While WPB sets up quotas for Latin American exports, unless clearance is given to exporters, such quotas cannot and are not being shipped. In some instances, mills report that completed orders have had to be stocked in the mills for varying periods of time awaiting clearance. Some mills have been inclined to take export orders calling for standard items so that if difficulties arise in delivering such orders, the material can be sold domestically.

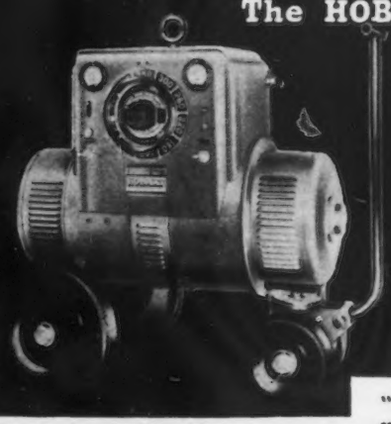
UNITED STATES steel production has snapped back to 99.5 per cent of capacity after last week's low point of 98 per cent. Pittsburgh operations have gained half a point to 102 per cent and Cleveland output has climbed thirteen points to 102 per cent. Steelmaking in the Detroit area has increased two and a half points to 107 per cent and in the St. Louis district the gain amounts to three points, or 102.5 per cent of capacity. Chicago ingot output is down two points to 97 per cent and in Wheeling steel production has fallen one point to 89 per cent. Operations in the Cincinnati area have declined two points to 107 per cent while Eastern production has been lowered a point and a half to 89 per cent. Youngstown at 94 per cent, Philadelphia at 96 per cent, Buffalo at 104.5 per cent and Birmingham at 102 per cent are unchanged from last week.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S.Ohio River	St. Louis	East	Aggregate
May 6	101.5	99.0	94.0	96.0	89.0	104.5	90.0	102.0	104.5	102.0	109.0	99.5	90.5	98.0
May 13	102.0	97.0	94.0	96.0	102.0	104.5	89.0	102.0	107.0	102.0	107.0	102.5	89.0	99.5

The HOBART Arc Welder talking...



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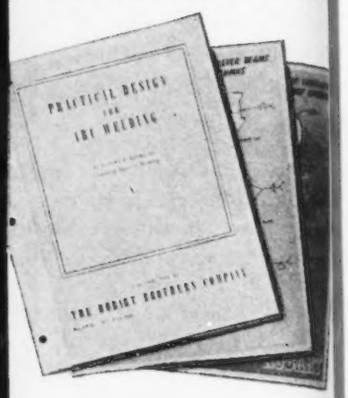

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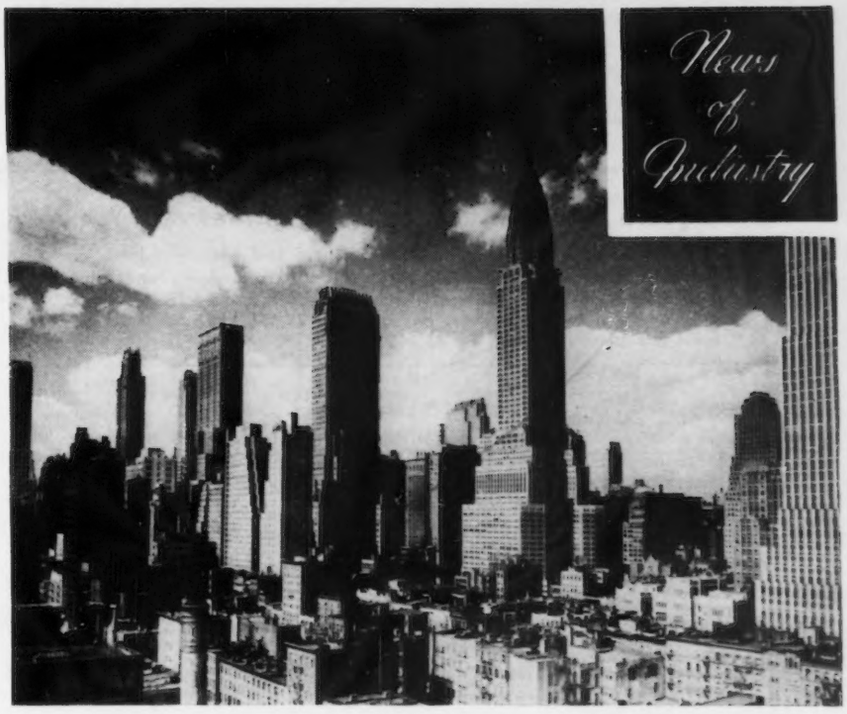
New York City's Problem Not Too Discouraging; Pooling of Skills Would Provide Big Boost for War Effort

By S. H. BARMASEL
Associate Editor



• • • **New York City** has received much national publicity lately, some of it picturing the metropolis as the "forgotten city" of the war production program, a city gradually shrinking in size and importance, a city from which thousands of persons were migrating.

Because New York is important in the metalworking industry THE IRON AGE has spent considerable time recently attempting to get to the bottom of the facts. The prospects for the city are not as discouraging as many persons have been led to believe.

The problems facing New York require the therapy of a psychoanalyst. Behind the brittle facade of a sophisticated city lies a trembling core of small plants. Of the 27,000 manufacturing plants in metropolitan New York, about 25,000 employ 50 persons or less. Before the war program these concerns were mainly suppliers of consumer goods. While elsewhere the nation's industries converted to supplying wartime needs, many New York industries found the adjustment too difficult and became distressed. Unemployment rose. Last year about 368,000 persons were out of work.

The causes for this maladjustment were both external and internal. Many of these plants did not possess the managerial and engineering skill necessary for the changeover. Some did not have the equipment. New York was considered a luxury town where money was spent at fine department stores and night clubs. It was all meringue, no bread and butter.

Finally, a board of therapists was set up—Mayor F. H. LaGuardia's business advisory committee made up of city officials, business men and labor leaders. The consultants have expanded to include Smaller War Plants Corp. and the military and naval procurement agencies. Progress has been made but the cure is a long, hard process. Prime contractors have still to be urged to place their subcontracts in New York. Procurement officers have to acquire a full awareness of New York's capabilities.

More and more essential consumer goods are now being manufactured in this area. Contracts for uniforms have been placed in New York's garment center. In the works is SWPC's experimental New York Plant, by which it is hoped to bring together officials and purchasing agents of the larger commercial houses with the small plants that will be able to provide them with consumer goods. But a serious problem still exists in the case of the small metal and woodworking shops. In this area there are 7000 such metalworking plants. About one-third of the plants now are producing war goods. One-third do have the facilities for conversion to war production and the remainder is considered hopeless as far as chang-

Active Placement File, By Employment Status, Sex, and Occupational Group—New York Metropolitan Area, March 13, 1943

(Source: United States Employment Service, Division of Reports)

	TOTAL	MALE		FEMALE	
		Employed	Unemployed	Employed	Unemployed
NEW YORK METROPOLITAN AREA(a)					
Total file	195,134	28,530	97,472	5,539	63,593
Skilled	39,561	5,388	30,129	228	3,816
Semi-skilled	24,256	4,026	12,131	487	7,612
Unskilled	13,705	1,213	9,302	347	2,843
NEW YORK CITY					
Total file	178,270	26,608	88,926	4,981	57,755
Skilled	35,928	4,901	27,152	215	3,660
Semi-skilled	22,097	3,745	11,047	447	6,858
Unskilled	11,990	1,089	8,068	291	2,542
Industrial Office	41,259	7,016	21,928	759	11,556
Skilled	7,811	2,584	4,979	17	231
Semi-skilled	8,466	2,168	5,221	105	972
Unskilled	5,568	801	2,820	147	1,800
Building and Construction					
Office	27,561	1,771	25,790		
Skilled	20,255	1,478	18,777		
Semi-skilled	2,288	111	2,177		
Unskilled	4,888	163	4,725		
Needle Trades Office	18,198	1,557	5,596	638	10,407
Skilled	6,128	409	2,211	182	3,326
Semi-skilled	10,013	1,006	2,988	316	5,703
Unskilled	1,238	94	310	131	703

(a) Includes New York City and Nassau, Suffolk, and Westchester Counties.

Note: Employed applicants are persons with a job, including part-time and skip-week workers, self-employed, persons temporarily absent from their jobs and persons assisting without pay in family business. Unemployed applicants are persons without work of any sort, including new entrants to the labor market and persons on WPA or NYA projects.

Available Hours on Critical Tools in Metropolitan New York

• • • Below is a comparison of the critical tool hours available in the metropolitan area to the production service board and Army and Navy munitions board on April 27, the date of the latest report, and on Nov. 7, 1942. In Brooklyn, the total available hours has declined 28,461 hours while in New York the total has been increased by 45,746 hours.

MACHINE	As of April 27, 1942		As of November 7, 1942	
	Brooklyn	New York	Brooklyn	New York
Horizontal Boring Machine, 3 in. Bar	582	2,818	1,108	1,943
Horizontal Boring Machine, over 3 in. Bar	466	1,678	965	841
Vertical Boring Mill, 54 in.	171	744	756	893
Vertical Boring Mill, to 84 in.	652	952	655	
Vertical Boring, to 120 in.	216		168	144
Vertical Boring, over 120 in.	104	100	100	
Jig Borers	651	2,576	1,332	1,177
Misc. Borers—Precision		285		211
Broachs	212	2,450	298	1,565
6 ft. to 8 ft. Radials	1,163	844	2,093	1,347
Over 8 ft. Radials			216	
Duplicating and Profiling	180	3,842	536	1,491
Drop Hammer Board	52	2,753	822	3,383
Drop Hammer, Steam	1,282	2,162		672
Press Forge, Steam				
Hobbers—48 in. up		833	168	168
Bevel Gear Cutters	534	1,622	583	822
Centerless Grinders		1,357		1,260
External Cylinder Guards	4,793	30,084	4,363	22,685
Internal Cylinder Guards	1,914	10,173	263	2,498
Thread Grinders		464		672
Lathe—24 in./60 in., c. to c. up	3,905	9,196	9,041	8,901
Lathe, over 24 in./60 in. c. to c.	1,709	4,051	4,932	5,420
Lathe, over 24 in./96 in. c. to c.	1,782	6,087	4,214	6,692
Lathe, over 24 in./over 96 in. c. to c.	4,934	8,856	8,402	6,974
Turret, 12 in. Sw/2½ in. bar, c. to c.	1,426	2,260	1,849	3,739
Turret, to 24 in. Sw/2½ in. bar	2,678	6,833	3,189	2,089
Turret, over 24 in. Sw/2½ in. bar up		2,125	130	1,149
Automatic Lathe, 12 in.	54		48	138
Automatic Lathe, to 24 in.	711		778	168
Automatic Lathe, over 24 in.		408	90	
Automatic Screw Single— 1 in.	2,669	7,820	3,016	6,728
Automatic Screw, Single, to 3 in.	2,495	6,452	1,758	5,229
Automatic Screw, Single, over 3 in.		596		372
Automatic Screw, Multiple—to ⅜ in.		432		173
Automatic Screw, Multiple—to 1 in.	2,375	6,817	7,574	3,960
Automatic Screw, Multiple—to 3 in.	1,812	1,467	3,984	833
Automatic Screw, Multiple—over 3 in.				
Miller, Horizontal, 12 in. wide	2,615	11,170	5,992	6,905
Miller, Horizontal, 14 in. and up, wide	1,773	6,475	1,815	4,595
Miller, Vertical, 12 in. wide	790	1,153	502	429
Miller, Vertical, 14 in. and up, wide	638	1,406	1,332	524
Miller, Mfg. Horizontal, 12 in.	602	2,941	943	1,338
Miller, Mfg. Horizontal, over 12 in.		1,152	183	803
Miller, Planer, over 30 in. slab		194		
Miller, Planer, over 30 in. side		220		
Miller, Planer, over 30 in. vertical	373	320	336	221
Miller, Planer, over 30 in. side and vertical			168	84
Misc. and Die Miller Cut	128	521	168	524
Planer, 60 in. to 15 ft.	52	276	52	336
Planer, 60 in. over 15 ft.	52	108	52	
Planer, over 60 in. to 15 ft.	128	261		196
Planer, over 60 in. over 15 ft.	52	304	148	168
External Thread Mill	1,008	1,216	1,072	638
TOTALS	47,733	156,854	76,194	111,098

ing to war output is concerned. The regional office of the SWPC considers that if it helps 30 per cent of these distressed plants, it will have done a swell job. If it does more than that, it will be above expectations. Its task is without doubt a most complex one. Its liaison officers in the procurement offices have to find the contracts suitable for these smaller plants. But its work is not finished when it has taken a firm out of distress, for d i s t r e s s, like the dreams of a psychotic, can be recurrent.

One New York company, one of the largest automotive manufacturers this side of Detroit, for example, is now working two shifts a day on war orders but expects by the middle of the summer to be forced to lay off its 350 employees. It is equipped to make chassis, frames, steel bodies and trailers. Its New York location should be in its favor since its units have only to be driven to the pier and then shipped across the Atlantic, yet no further contracts have come in. One of the company executives feels that its lack of orders is a direct result of the attitude existing in the Tank-Automotive Center. "They just don't think that any company outside of Detroit and Cleveland can make these things."

Yet New York has many advantages for war production. Its transportation system is excellent and cheap. Its housing facilities are available to many thousands more. Its labor supply is still abundant as shown by the March 13 report of the United States Employment Service. In its active placement file, 195,134 registered for work on that day. Of these 39,561 were skilled workers, 24,256 were semi-skilled and 13,705 unskilled. The number of applicants without work of any sort in the unskilled group amounted to a little less than 35,000.

The prospects for New York are hopeful. Commissioner Sloan of the city's department of commerce says that New York is better off than it was thought it would be last year. Unemployment is steadily decreasing. From 368,000 unemployed last year, the number without work has fallen to about 160,000 at present.

New York may no longer be a city in the dark, but it is still in its twilight of capabilities. Should these smaller plants pool their manufacturing capacities under a central management, inspection and engineering force which collectively they could readily support, they could, on the basis of the above figures, apply to the war effort an additional labor force equivalent to approximately one-half of the workers employed by two of the largest war material producing companies, namely Ford and General Motors.

More Warehouse Officers Elected

Cleveland

• • • **In addition to** the elections listed in the May 6 issue of THE IRON AGE, the following chapters of the American Steel Warehouse Association have elected officers:

Central States — President, A. J. Kueber, Steel Warehousing Corp., Chicago; vice presidents, W. J. Holliday, W. J. Holliday & Co., Indianapolis; W. H. Tudor, Indianapolis Machinery & Supply Co., Indianapolis; secretary, T. B. Daniels, Jones & Laughlin Steel Corp., Chicago; treasurer, L. B. Kidwell, General Steel Warehouse Co., Inc., Chicago.

Missouri Valley—President, Fred L. Evans, Steel Mfg. & Warehouse Co., Kansas City; vice president, W. P. Patterson, Patterson Steel Co., Wichita, Kans.; secretary-treasurer, Herman H. Kuehlke, Richards & Conover Hardware Co., Kansas City.

New York — President, Charles Kramer, United States Steel Supply Co., Newark, N. J.; vice presidents, William G. Carter, Faitoute Iron & Steel Co., Newark, N. J.; James P. Donnelly, Atlas Supply Co., Inc., Brooklyn; secretary-treasurer, William C. Hughes, Bright Steel Corp., New York.

Northwest—President, L. H. Williams, Williams Hardware Co., Minneapolis; secretary, Winter Dean, Nicols, Dean & Gregg, St. Paul.

Philadelphia — President, Leslie Edgcomb, Edgcomb Steel Co., Philadelphia; secretary-treasurer, J. M. Mead, Joseph T. Ryerson & Son, Inc., Philadelphia.

St. Louis—President, A. L. Petersen, Joseph T. Ryerson & Son, Inc., St. Louis; vice president, Bruce Haines, E. E. Souther Iron Co., St. Louis; secretary, L. F. Niemann, United States Steel Supply Co., St. Louis; treasurer, E. W. Fleer, Schurk Iron Works, Inc., St. Louis.

Wisconsin—President, George W. Smith, Joseph T. Ryerson & Son, Inc., Milwaukee; vice president, John C. Pritzlaff, John Pritzlaff Hardware Co., Milwaukee; secretary-treasurer, Fred O'Dell, Edgar T. Ward's Sons Co., Milwaukee.

41,000 Enemy Patents Seized; Industries Are Invited to Study Them

• • • **More than** $7 billion of assets of enemy and enemy-occupied nations have been "frozen" by the United States or are under control of the Alien Property Custodian. Enemy interest in 285 business enterprises has been taken over. Approximately half of these have been liquidated and their physical properties made available.

A total of 41,077 patents and pending patent applications owned by enemy nationals and nationals of enemy-occupied countries, covering inventions in every field of applied science, have been vested and are under the control of the custodian. They include many patents covering processes which have enabled the enemy to carry on mechanized warfare while cut off from basic raw materials. They include 1282 in the field of ordnance and aeronautics; 25,423 relating to manufacture, transportation, power and machinery; 6647 chemical; 836 metallurgical; and 6889 electrical. Additional patents still are being studied.

Patent licenses obtained from the custodian have enabled a number of small business concerns to convert their plants to war production.

American business is being encouraged to find out about the patents which may help in production. Complete catalogs, listing all patents available for licensing, and classified lists of subject groups have been prepared. Requests for the catalogs are now coming in at the rate of about 750 a week, and for the classified lists at about twice that rate.

During the last war the Alien Property Custodian had seized some 17,000 enemy-owned patents and copyrights. Some of these were sold to the Chemical Foundation, Inc. (a private, non-profit Delaware corporation set up at President Woodrow Wilson's direction) and licensed by that organization to various American business enterprises under arrangements designed to exclude permanently hostile alien control. The great majority of these patents, however, were returned to their alien owners subject to licenses to the United States government. In spite of these precautions, German interests intent on monopolizing American enterprise gradually regained throughout the years a substantial degree of influence.

Immediately after the close of the last war German finance and industry began the building within the United States of a powerful organization centered in the chemical field, but extending also to the electrical and heavy goods industries, according to the Office of War Information.

Under the existing policy announced by the Alien Property Custodian, the benefits derived from the patents seized during this war will be spread far and more widely than was the case in the last war. During the last war the government granted exclusive use of patents to individual corporations. Today, the government grants only non-exclusive licenses and charges no royalties. However, in the case of patents which, at the time of vesting, were already subject to exclusive licenses for which royalties were paid by the American licensee, the Alien Property Custodian while vesting the title to the patents has allowed the licensee to continue in effect so that the royalties on such licenses are paid to the United States government. The licensee, however, may, if he wishes, relinquish his exclusive license and obtain a non-exclusive royalty free license in place thereof. Similarly, the Alien Property Custodian has indicated that if the war effort requires, he may cancel the exclusive license and make the patent generally available to American industry.

Licenses are issued to any reputable American firm or individual on payment of a license application fee of $50 for each single patent, plus $5 for each additional related patent. Licenses extend for the life of the patent unless revoked for failure to live up to the license agreement or unless the interest of the government requires their revocation. Accordingly, rights to the use of many of the most valuable patents are within the reach of even the smallest American enterprise.

Each vested patent and patent application has been listed under the standard Patent Office classification of patents. These lists are available for distribution on payment of a fee, 10c. for each numbered classification except for nine of the larger classes, where the charge is 25c. each. Complete catalog is available for $5. Classified lists and catalogs may be obtained from the Chicago branch of the Office of Alien Property Custodian. Printed copies of vested patents and drawings and specifications of vested patent applications may be obtained from the Commissioner of Patents, Washington, D. C., for 10c. each. In addition, "libraries" of copies of vested patent have been opened in New York, at 120 Broadway, and in Chicago, in the Field Building.

The vested patents include recent developments of Skoda and Schneider et Cie; alloys and metallurgical equipment of Societe General Metallurgique de Hoboken; the electrical ignition systems of Robert Bosch; the automobile motor inventions of Daimler-Bens, Fiat, Marelli; the chemical products of Montecatini, Kuhlmann and Norsk-Hydro, and the electrical equipment of Kwaisha Toden Denkyu Kabushiki.

How to Get a Patent License

1. Write to the Office of the Alien Property Custodian, Chicago, Illinois, for an index of patents vested in the Alien Property Custodian.

2. Write to the same address for classified lists of vested patents and patent applications in which you are interested. All classes are sold for 10c. each, except 9 classes which are 25c. each.

3. Printed copies of vested patents and drawings and specifications of vested patent applications may be secured from the Commissioner of Patents, Washington, D. C., for 10c. each.

4. Send to the Office of Alien Property Custodian, Washington, D. C., your letter of application for a license to use a vested patent. Application fee of $50, plus $5 for each related patent to be covered in one license should accompany application.

5. In preparing letter of application give following information.

   a. Name and address.
   b. Nature of business.
   c. Legal form of business (corporation, partnership, sole ownership, etc.).
   d. Registered trade name, if any.
   e. Date and State of incorporation, if a corporation; date of formation, if partnership.
   f. Name, citizenship and legal residence of officers and directors, partners or proprietor, as case may be.
   g. If a corporation, the percentage of voting stock owned by or for the benefit of non-citizens of the United States.
   h. Number and title of specific patents or patent applications sought.
   i. Facilities for using the inventions sought (equipment, technical skill, available or proposed capital).
   j. Purpose for which license is needed and its relation, if any, to the war program.
   k. Statements as to whether any existing licenses are known under the patents or patent applications requested.

Steel Industry Employment Figures Complicated by High Turnover, Absences

Pittsburgh

• • • **When are 41.5 hours** a week per employee really 45.5 hours? How can steel mills average 48 hours a week when there is absenteeism, turnover, and sudden draft calls? How can a real honest-to-goodness figure covering average hours per week per employee be obtained without it being distorted by "quits," "hires," and time off? These are a few of the questions that are slowly driving steel statisticians "nuts."

Until there is a universally and accepted method of correcting for absenteeism and turnover in the steel industry, average number of employees "ready to work" will be highly inflated and will not represent a true picture of actual conditions.

A check by THE IRON AGE shows that in some plants, employees have left the company but have not notified management which has carried them on the payroll. In other cases it has been found that employees who have left for the Army have been carried on the payroll for weeks. Other cases have come to light where a large number of employees have been absent two to five days a week but are included in calculating the average work week statistics.

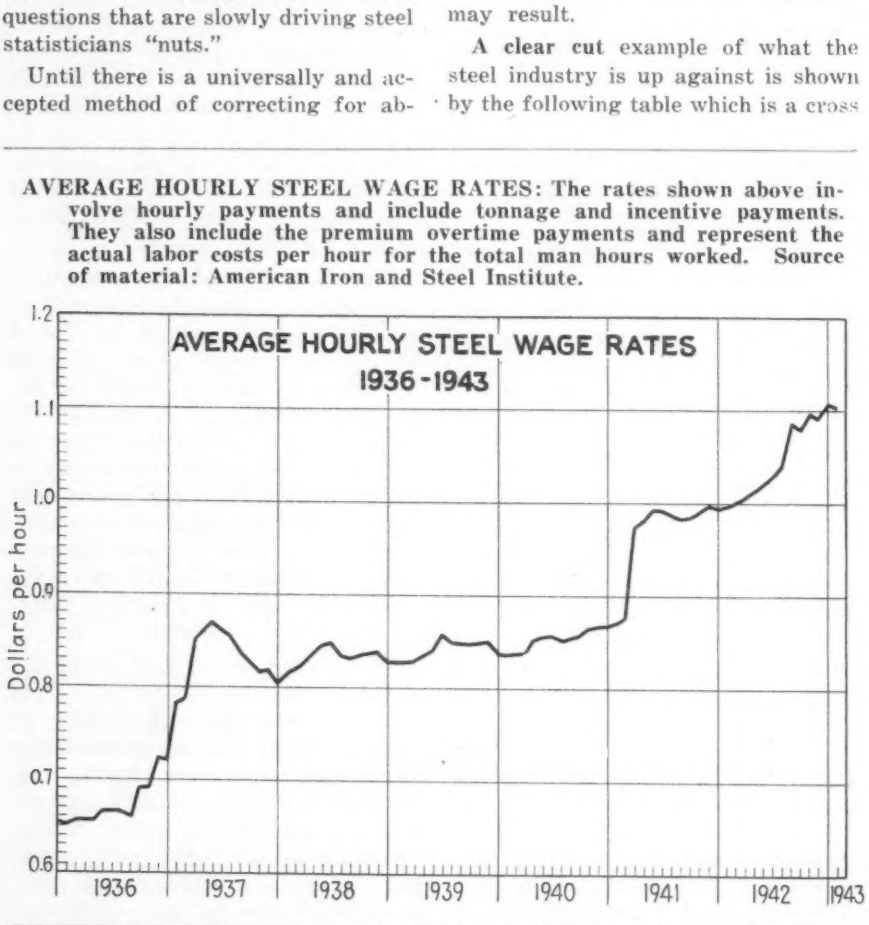
Such official weekly hour figures are used and interpreted by agencies like WMC which does not comprehend the vast amount of detail and difficulty in striving for an undiluted average-hours-worked-per-week figure. Still, unless some progress is made by steel companies to delete the influence of turnover and absenteeism from their personnel data, incorrect decisions may result.

A clear cut example of what the steel industry is up against is shown by the following table which is a cross section of one week's experience in a large steel company:

No. of Employees	Days Worked Per Week	Per cent of Total
1144	None	4.7
147	1	.6
268	2	1.1
375	3	1.5
998	4	4.1
8426	5	34.8
12575	6	51.9
307	7	1.3

About 52 per cent of this plant is on a six-day week. However, if the men working no hours a week and those working less than five days a week are ignored, (as should all employees not available for work) 60 per cent of this plant is already on a six-day week.

AVERAGE HOURLY STEEL WAGE RATES: The rates shown above involve hourly payments and include tonnage and incentive payments. They also include the premium overtime payments and represent the actual labor costs per hour for the total man hours worked. Source of material: American Iron and Steel Institute.



The number of men shown above who were carried on the payroll but did not work at all in that week is surprising and probably includes those who quit without notice, some who went to the army and were not taken off the active rolls, some who were sickness or accident cases and some who just "took the whole week off." To a limited extent, this same thing applies to those shown as working from one to three days a week.

A summary of possible inflations in employee figures, depending on the company, would be somewhat as follows:

1—Carrying employees on payrolls who have quit without notice.

2—Slowness in taking draftees and enlisted men from the active payroll.

3—High turnover which often means that several men quit in one week and others are hired the same week, thus running the number of employees for that week above actual conditions, i. e. if two men quit and two are hired in one week, four are shown on that payroll—when the true figure would be closer to two or two and a fraction, depending on the length of time worked by each.

4—Long sickness and accident cases being carried as active men on payroll.

5—Absenteeism cases where men are off for personal reasons for periods running from one day to an entire week.

While many plant statisticians are attempting to find a solution to the problem (which seems simple but is one of the toughest ones to crack) it is difficult to find an answer because of the various factors involved and the inability under any conditions to get a "true and accurate figure." This leaves any solution open to argument and debate because many people will not realize that any data which is sounder than that used before is a better factor to use.

Some suggestions on possible corrections for this statistical problem which if agreed upon by all those involved might mean the making of decisions on a more practical basis would be as follows:

1—Separate as soon as possible all men who have joined the armed forces.

2—Establish a close check on quits and hires so that men who leave are immediately taken off the payroll.

3—Establish by conference an agreement by which quits and hires are closely watched and the average number of employees be obtained by taking those on the payroll at the beginning and end of the period.

While this will not be the "pure" figure, it will be the best that can be obtained without going to "research laboratory" methods.

4—Establish by conference and agreement a formula for absenteeism. One suggestion is that either the number of absentees are deducted from the number of total employees so that they will not dilute the average hours worked per week per employee or else the number of hours lost by the absentees be added to the payroll hours worked in order to offset the higher employee figure.

A combination of the above safeguards might do much to clean up the figures now being used to obtain an average-hours-worked-per-week figure. Under normal times it would be satisfactory to use the present method of figuring because turnover is low, absenteeism is only a normal factor and management often does not have the work to offer men on the payroll. Under present conditions it is obvious that none of these factors are operating except the one where lack of WPB sanction or lack of available steel ingot and semi-finished tonnage, holds down the work week on some finishing mills to less than six days a week.

No matter what WMC rules and no matter what statistical methods are used it will be almost impossible for the steel industry to show average 48-hr. work per employee a week. In order to do so it would mean that a very large part of the force would have to work more than 48-hr. per week. With the work not available with double time in effect for the seventh consecutive day and with absenteeism a factor, it is doubtful if the theoretical condition of an "average 48-hr. week" in the steel industry can be obtained.

Just as important are the problems of what to do with a man who can only work at his regular job for say 36 hours because that is all the mill works. Will he accept a job elsewhere in the mill if that rate is lower than his regular rate? Job-experience already shows that he won't. What about the skilled men who might have to be laid off? They will be available for the labor needs but what will their reaction be if they have to take a job that pays less than the one they left. What about senority rights? These are only a few of the headaches that are facing steel management and steel workers, all of which must be settled to some extent by July 1.

STOVEPIPE CITY: This is what the Seabees have christened their final training camp at Port Hueneme on the West Coast. They got the nickname from the appearance of the Quonset huts.

McNutt Will Modify 48-Hr. Steel Week

Washington

• • • **That the WMC** order to establish the 48-hr. week in the steel industry will be modified was made clear on Monday by War Manpower Chief Paul V. McNutt. This move to grant exemptions has been made in response to contentions of the steel industry that the order as issued is not practical and should be made flexible to accord to varying operating conditions of the different units in the industry.

It has been maintained by steel executives that if the existing order were left unchanged its application would entail prohibitive costs that could be met only by increased prices or result in a loss of rolled production from the discharge of skilled workmen.

The new steel order regulation, Mr. McNutt said, is being prepared by the WMC Labor Management Policy Committee. Only recently the WMC regional directors cast a majority for immediate extension of the 48-hr. week to the steel industry.

The decision of the WMC to modify the steel order created a flareup in the organization. Angered at the decision to modify the steel order Fowler Harper, deputy WMC chairman, known as an "advanced thinker," has resigned and has taken a berth in the BEW. Also planning to resign and go to that overstaffed government outfit is Miss Edith Keyes, assistant to McNutt.

The main objection to an inflexible 48-hr. week is based on the requirement that time-and-a-half be paid for

BRITISH MISSION: A group of leading British metallurgists touring American steel plants recently visited the Brackenridge plant of Allegheny Ludlum Steel Corp. They were especially interested in plants specializing in alloy steels.

This is no time to let machinery run dry. Proper maintenance means proper lubrication. Yes, lubrication is an all-important factor in making present equipment last longer. So, here are just a few suggestions for keeping your **FORD TRIBLOCS** in efficient working order:

- Gear case cover should be removed occasionally and a small quantity of heavy graphite grease applied to gear chain.
- Load chain should be cleaned and lubricated frequently with a heavy oil. A lubricated chain will far outlast a dry chain.
- Load sheaves should also be greased.
- Oil bearings frequently to avoid needless and excessive wear.
- Oil holes are provided in the **TRIBLOC** at vital points. These should be used frequently.

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the added week day. The industry insists that the 48 hr. week as provided by the WMC order would reduce rolled steel production.

The reason production would be reduced is that the companies claim that the present price structure on certain items of steel production cannot be maintained except at a loss. The loss would be caused by workers standing by when WPB orders direct the reduction in the production of an item by, for example, 50 per cent. It is not contended, though, that the 48-hr. week would reduce ingot output, but as now phrased it is too inflexible for practical application.

On the other hand, CIO says that the 48-hr. week is needed to maintain production at present levels. It points out that because draft calls have diluted skilled forces with inexperienced workers, crews are not able to turn out work as rapidly as previously.

The American Iron and Steel Institute has previously declared that the 48-hr. week will cost $104,000,000 annually, and cause the discharge of 100,000 employees. Labor counters with the belief that the action will cost the industry $73,000,000 and the displacement of 50,000 workers which can be taken up by new steel expansion. But this seems problematical, steel executives say, because a good proportion of steel expansion which was supposed to be completed by July 1, the effective date of the WMC order, will not be finished until the first part of next year.

The union estimate of cost differs from the Institute's estimate because the union claims that instead of 8 hr. at time-and-a-half for the 520,000 workers in the industry, payment would only have to be made for 5½ hr. The difference in hours would be caused by breakdowns and absenteeism.

Discussion of whether the steel industry should go on a 48-hr. week may become academic if War Manpower Chief Paul McNutt orders the whole country to go on this working basis, as it is reported he intends to do. Furthermore, steel executives see in the nationwide 48-hr. week a double-barreled effort to circumvent John L. Lewis's demands, while increasing pay envelopes and still preserve the "Little Steel" formula. Also, if Mr. Lewis should get a substantial portion of his demands, high administration sources say that it will be possible to give lip service to the "Little Steel" formula for a longer time. The 48-hr. week will forestall demands, it is claimed.

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One "HARDSTEEL" reamer has done more than 1200 to date and is still in service. Developed to drill hardened steels of Rockwell C 40 or higher, "HARDSTEEL" is now available in reamers, tool bits and special tools for working the abrasive alloy metals and plastics. Try it. Note its longer service per grind—faster cutting action because of extreme edge hardness—its ease of grinding on any wheel.

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Payroll Record Set For Steel Industry

• • • Payrolls of the steel industry during March topped all previous records with a total of $136,813,000, according to the American Iron and Steel Institute. This represents an increase of approximately 11 per cent over February. Employment also registered an increase over the previous month with an average of 637,000 during March as against 635,000 in February, according to the Institute.

L-237 Modifies Deliveries On Light Power Driven Tools

Washington

• • • Provisions controlling production and distribution of certain light power-driven tools were modified slightly last week by WPB in an amended version of L-237.

The purchase or delivery of light power-driven tools on ratings assigned by a PRP certificate or applied pursuant to CMP Regulation No. 5 or 5A is not permitted by the amended order. This provision, however, does not apply to deliveries of items which had a producer's list price on Oct. 15, 1942, of $175 or less, an increase from the original limit of $35. It also does not apply to deliveries by producers on purchase orders received prior to May 3, which have been rated pursuant to CMP Regulation No. 5 or 5A. Schedule A attached to the order was amended to remove purely woodworking tools which are covered to a large extent by Order L-83.

COMING EVENTS

May 17 to 18—National Association of Sheet Metal Distributors, Cleveland.

May 17 to 19—American Gear Manufacturers Association, Rye, N. Y.

May 24, 25, 26—National Association of Purchasing Agents, New York.

May 27—American Iron & Steel Institute, New York.

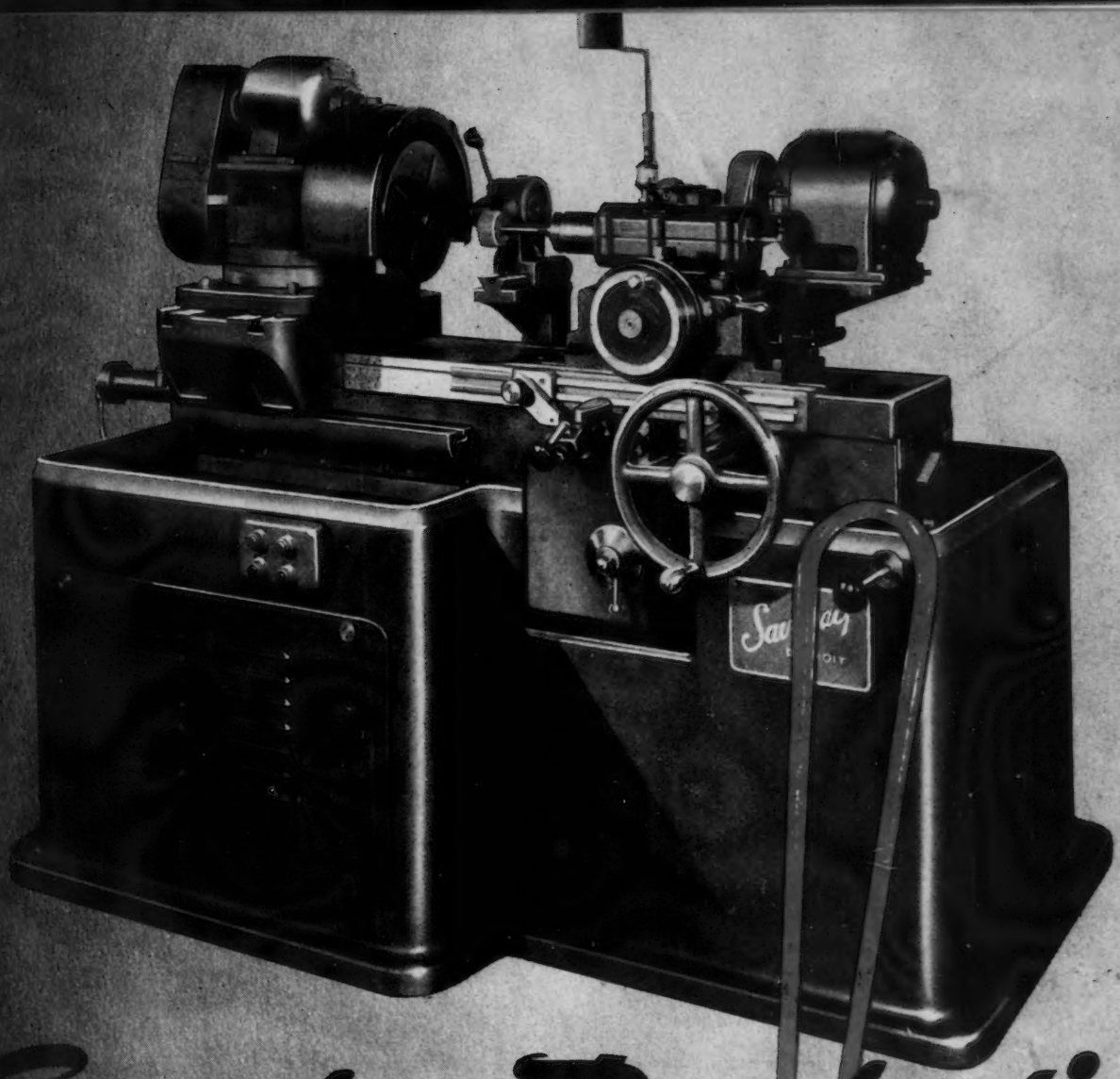
May 27—National Metal Trade Association, Chicago.

June 2 to 3—SAE Diesel Engines and Fuels and Lubricants meeting, Cleveland.

June 7 to 9—American Electroplaters' Society annual convention, Buffalo.

June 9 to 10—SAE War Materiel meeting, Detroit.

Oct. 13 to 16—The Electrochemical Society, Inc., New York.



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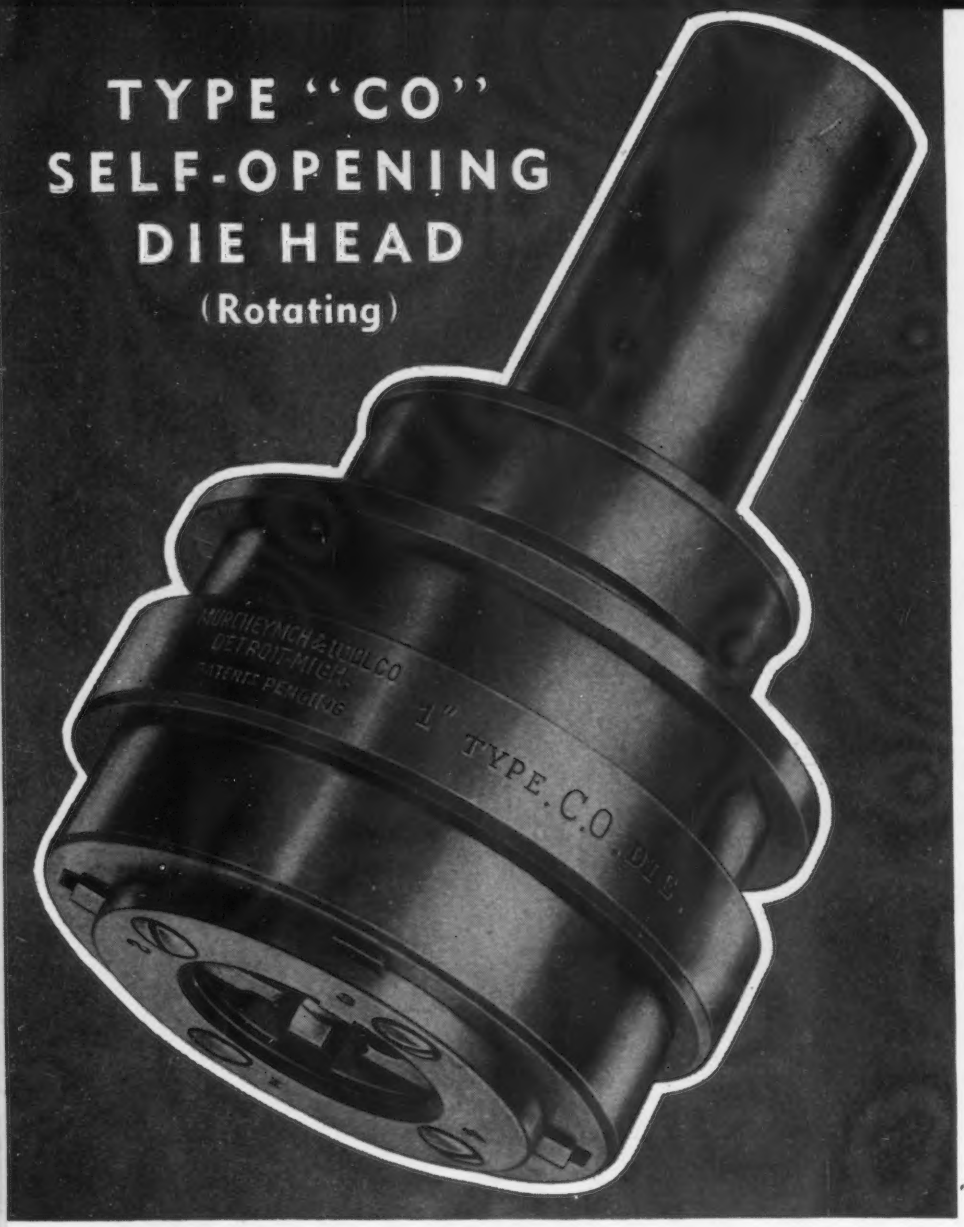

Delivery 4 Weeks

Real threading production from those types of machine tools requiring a revolving die head is obtained by this Murchey Self Opening Die Head. Real production of threads between chaser-grinding, and within the specified tolerances.

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Murchey manufactures all types of Collapsible Taps, Self-Opening Die Heads, Shell Tapping, and Thread Milling Machines.

Steel Expansion Log Still On; Industry Held To Be Free of Blame

Pittsburgh

• • • **Steel expansion** programs still are lagging badly but there is no evidence that the blame for this situation can be placed upon the steel industry. THE IRON AGE disclosed on Feb. 25, page 86, that many projects were running from one year to six months behind the original schedule

See related story, page 153.

and at that time it was stated that weak priorities and faulty governmental planning were at the bottom of the situation.

In the past few months the steel expansion and blast furnace programs have been repeatedly ignored by governmental agencies in order to get out more strategic projects. Despite the efforts of steel companies and contractors to cut through red tape and speed construction of a few parts of the program which have been holding back total projects, the final completion dates predicted in February on some big jobs are changed hardly at all.

Some members of the steel industry have expressed surprise privately that the WPB's attitude is that the steel companies "must rely more on themselves and less on the government in speeding the completion of a lagging expansion program." Such a statement, according to some astute sources, represents anything but the facts. There are numerous cases where steel companies and contractors have spent days or weeks attempting to get relatively small items.

Summing up some of the most noteworthy cases: Electric furnaces have been built on schedule but lack of power auxiliaries has been a retarding factor; some open hearths have been completed but operations held up through the lack of steel for pouring platforms or similar circumstances; some electric steel projects have been put months behind due to certain equipment being slipped back on rolling mill schedules because of urgent Army or Navy requirements; three blast furnaces in the Pittsburgh district alone are now running from 30 to 60 days behind schedules which were revised only a few months ago.

There apparently are legitimate reasons for some of these hold-ups but the planning and co-ordination in governmental circles, especially in WPB, have been so disjointed at times

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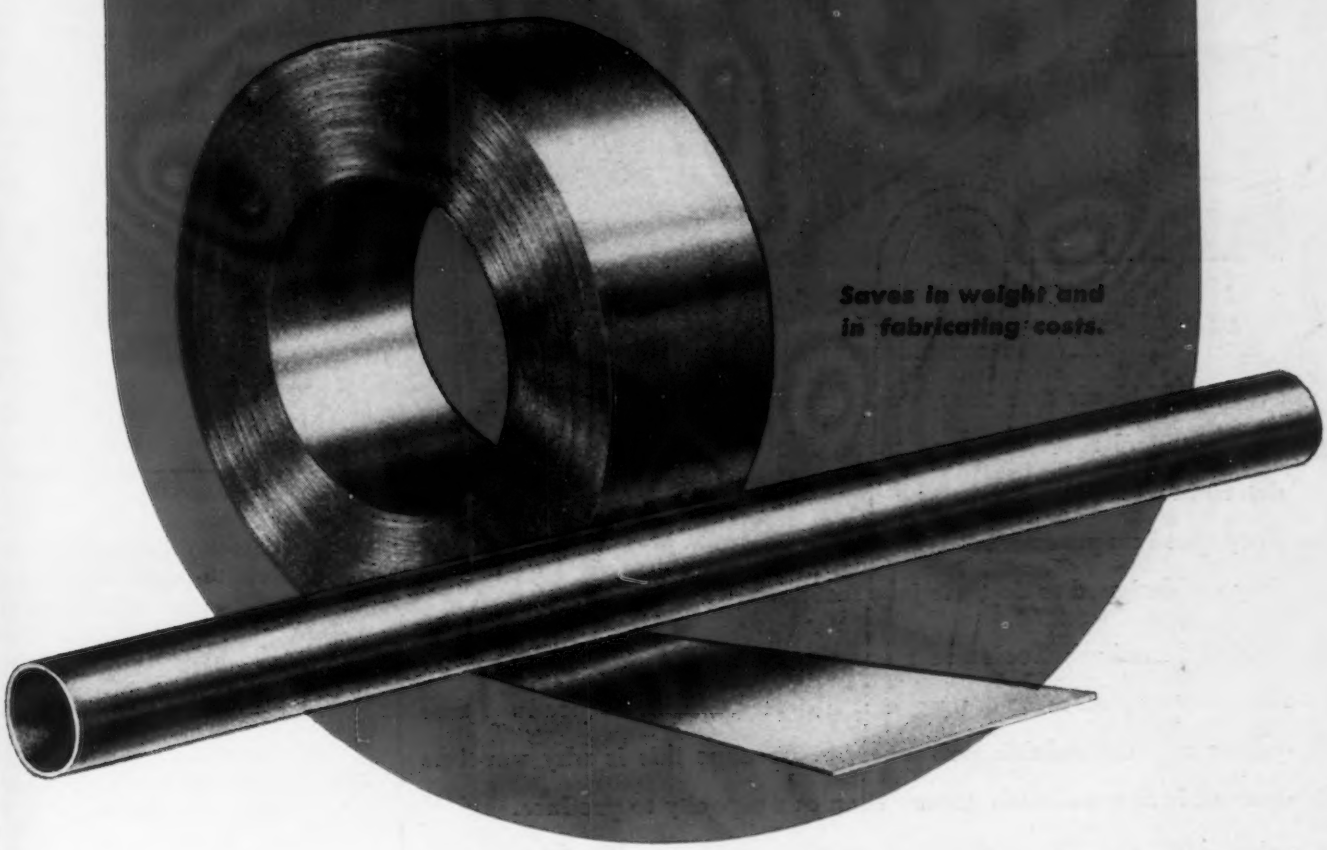

ELECTROWELD TUBING is manufactured on the latest type and most modern tube mills, thus assuring uniform high qualities at all times. This outstanding product meets accurately your rigid requirements, but more than that, the specified qualities are duplicated in order after order, and shipment after shipment. The Electroweld manufacturing process permits the selection of accurately rolled strip steel which definitely meets your needs. And, with this uniform, high quality basic material you obtain maximum strength, greater safety, more uniform wall thickness, uniform diameters, and silver-bright, smooth finish. Remember, too, the exhaustive tests made during 1929 by the Bureau of Standards proved conclusively that the weld in tubing is as strong as the wall, and has the same quality as the steel with regard to strength and other physical properties. The tests included expanding, beading, flanging, and drawing. Electroweld Tubing is made in strict accordance with Government, A.S.M.E. and also A.S.T.M. specifications. Hence, where performance factors are VITAL be sure to investigate the benefits of Electroweld Tubing.

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SIX ADVANTAGES

Uniform diameter-Uniform wall thickness-Uniform physical properties-Test-proven welds-Scale-free, silver-bright finish-Square cuts, minimum burr

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SAVING MINUTES where minutes count!

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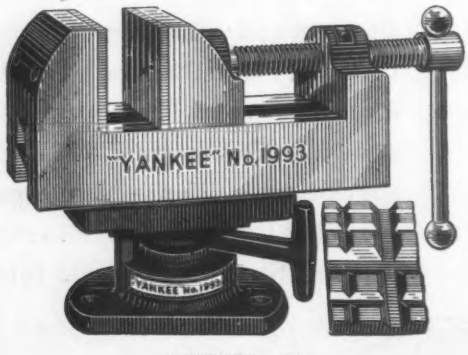
Behind "Yankee" Tools are more than a half century of precision manufacture, accurate testing and a determination to produce true quality and dependable performance. Perhaps this is why war-time demand is now so much greater than our capacity to produce.

We'll do our best to meet your needs. You can help us by providing priority ratings whenever possible. Order from your supply house or write to us . . . c/o Dept. 1A 5.



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L.c.l. Loadings Drop; Car Use Increases

• • • **The average load per car of less-than-carload freight carried by Class I railroads decreased from 20,549 lb. in January, 1943, to 20,461 lb. in February, ODT announced last week.**

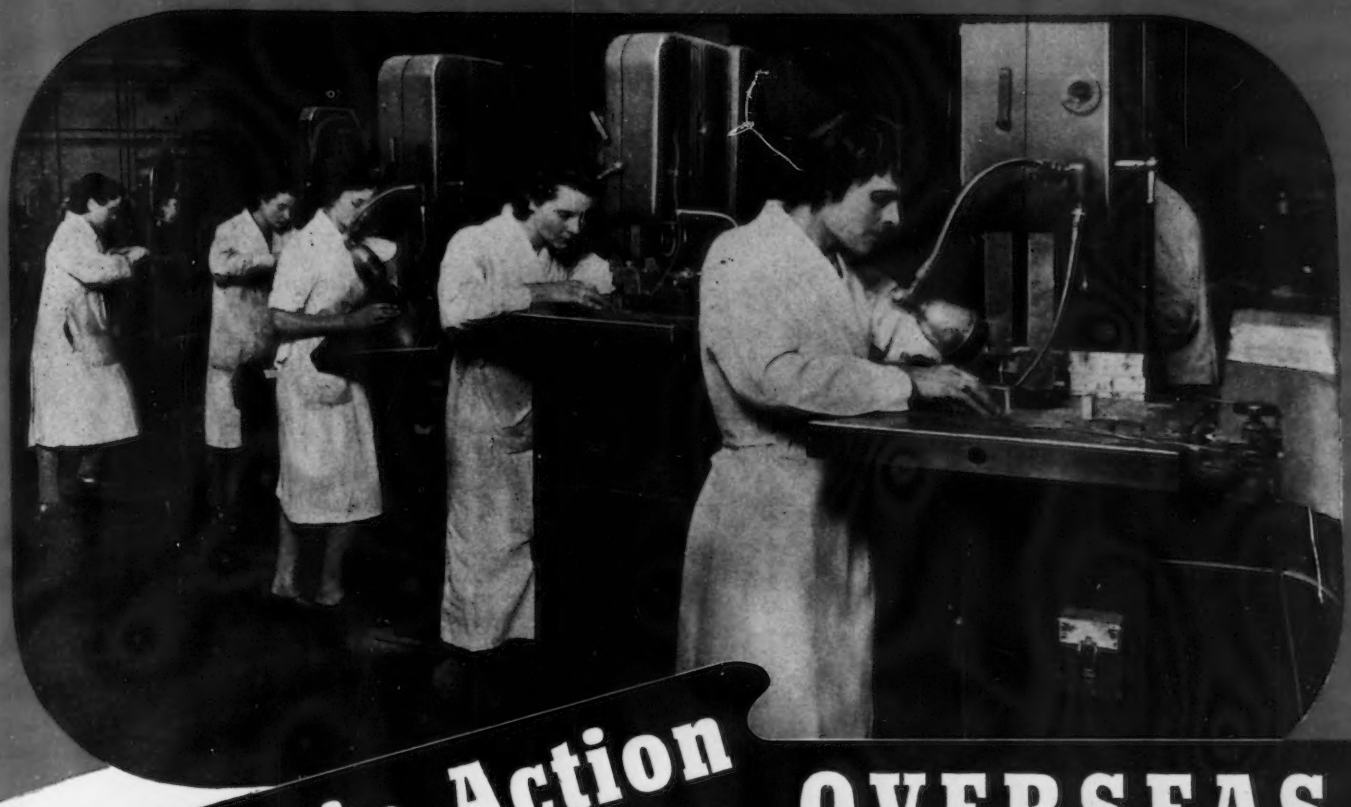
Total volume of merchandise freight handled by Class I carriers, which amounted to 7,827,345,440 lb. in January, increased to 7,899,815,666 lb. in February, while the number of cars used in the movement also increased from 380,914 to 386,086, resulting in a lighter loading per car. The February average of 20,461 lb. was still slightly above the 10-ton minimum prescribed since Sept. 1, under ODT's General Order No. 1, for loadings of l.c.l. freight.

as to adequately substantiate Pres dent Roosevelt's recent statement th there was more complacency Washington than out of Washingto

The admonition that the steel i dustry "must get more steel out existing equipment" is believed to a trifle superfluous in view of t unprecedented records already esta lished despite the handicaps of r tape, etc. Some sources believe th the optimistic production figure f steel ingots this year of 92,000,0 tons, made by the WPB, may fall sho by as much as two to three milli tons due to hold-ups in expansi programs. Practically all major e pansion programs announced recent as starting into production have i volved cases where only partial ope ations have begun.

Ordnance Plant Needs Your Aid

• • • **A Mid-West ordnance plant is endeavoring to locate manufacturers of hand portable nailing machines capable of handling nails 1½ in. or larger. These machines are to be used for closing crates. The unit must be a hand portable machine. If any reader can be of assistance, please communicate with the Chicago office of THE IRON AGE, 1012 Otis Building, Chicago. The information will be passed on to the ordnance plant.**



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2nd January, 1943

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Yours sincerely,

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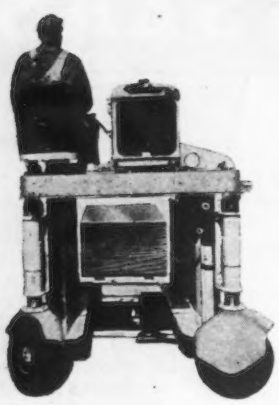

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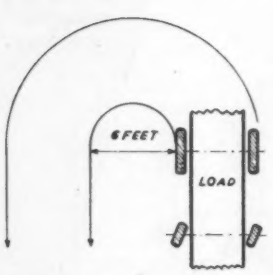

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Truman Committee Asks End to Feuding; President Criticized

Washington

• • • **The Senate** (Truman) Committee gingerly blames the Jeffers-Patterson-Forrestal-Nelson dispute over 100 octane gasoline, synthetic rubber, and escort vessel programs on the President. The committee's recently issued report says that the "influence from above must be always towards unity."

The committee recommended that the "strong over-all authority of the WPB" be made a "living reality," and that without dilution of the power of the chairman, WPB should function as a board.

The report calls for an end to "destructive, wasteful feuding," and also for "clear leadership in strong hands." It asks that someone "knock heads together," where necessary.

The implications of the report are that the President has not withheld power from WPB Chairman Donald M. Nelson—on paper; he has withheld it actually with every "czar" dispute eventually finding its way to the White House for settlement. A further implication is that the withholding of authority has not been accompanied with the President's close attention, and supervision of the problems.

The report by inference criticized the President:

"The present conflict is a result of basic weaknesses in the control of the war effort. . . . The chairman of the WPB was given sweeping powers which at least on paper appeared broad enough to enable him to direct war production under the commander-in-chief.

"Federal departments, establishments and agencies were ordered to comply with the policies, plans, methods, and procedures with respect to war procurement and production as determined by the chairman. The chairman was empowered to exercise his authority through such officials or agencies and in such manner as he might determine. His decisions were, by the terms of the order, to be final.

"**Today,** discussion of the over-all legal authority of the WPB is mere pedantry. Although the authority may exist it has not been exercised. But the chairman of the WPB has exercised authority to allocate materials and to schedule the production programs of the various departments, and to resolve conflicts between these programs.

"Even in the matter of scheduling, when the conflict between the rubber and the aviation gasoline programs reached major proportions, the dispute was carried from the chairman of WPB to the commander-in-chief, who upheld the chairman.

"The determination of the nation's rubber requirements was made on a plane superior to WPB. The findings of the President's rubber committee were ordered to be executed by a rubber director. This official was declared to be responsible to the chairman of the WPB, but was given power himself to issue directives to the various agencies. The chairman of the WPB was requested to divest himself of concern with the rubber program. Therefore, practically speaking, the chairman of the WPB has had only authority over the rubber director, although technically he is the boss.

"**An administrator** was placed in charge of petroleum programs, including aviation gasoline. The executive order declares that he

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40-Day Drive Nets 6,000,000 Womanhours

New Britain, Conn.

• • • **In a recent 40-day drive for the recruitment of women workers, over 2341 New Britain housewives entered local war plants, adding an estimated 6,000,000 womanhours to the productive capacity of war industry in addition to creating a potential labor pool of over 2000 women. This represents one out of every five women available for employment in the area, states the New Britain Womanpower Drive Committee.**

'shall be directly responsible to the President.' On the other hand, he exercises the 'powers, authority and discretion conferred upon the chairman of the WPB' with respect to the petroleum industry, 'subject to the direction of the chairman of the WPB.' The lines of authority are confusing, even on paper. As a practical matter they breed disputes such as that under discussion."

The report was complimentary to Mr. Nelson:

"At the present time, the order of expediting the various programs is considered settled by the WPB. A vigorous effort to schedule production is under way, apparently with the hearty approval of all concerned. The chairman of the WPB has declared that no new issue was presented to him before the present public flare-up, and his statement is sustained by the other testimony.

"**The job** of balancing the conflicting programs has been done, and is being done by the WPB. The task is one of tremendous magnitude. It can no more be accomplished by discussion before a committee than by castigation in the press."

To Messrs. Jeffers and Patterson, et al., the report says:

"Vigorous, able men are now at work on these programs attempting to make up ground lost because of our failure to set our sights high enough. There is a perfectly normal healthy tendency on the part of each leader to view his program as the most important. Each has complained to the committee that his program has been treated inequitably. It is perfectly clear today, as it was a year ago, that these three competing programs, synthetic rubber, 100 octane gasoline, and escort vessels, are essential to win the war.

"**The precise** balancing of these programs in point of quantity and of time is crucial. A serious error could spell disaster. The deciding agency must have the facts relating to all three programs before it. Its decisions must stick. Confusion in planning today will cut production a year hence. It defeats strategy. Weakness in enforcing decisions will breed confusion."

Daniel B. Ford Appointed New SWPC Regional Director

Cleveland

• • • **Daniel B. Ford**, WPB's fifth region deputy director, has been named SWPC regional director, covering Ohio, Kentucky, West Virginia, and western Pennsylvania. SWPC will concentrate on selling the program to agencies which can help utilize facilities of smaller plants.

SWPC activities in this region have increased. From Oct. 13 to Dec. 31, 1942, SWPC placed 95 prime contracts and 638 sub-contracts. From Jan. 1 to April 27, 1943, it placed 321 prime contracts and 1273 sub-contracts.

With that curtly classic reminder, one of America's most famous research engineers replied to a man in the act of rhapsodising about the wonderful ingenuity of man.

For the barnacle, he pointed out, is a symbol of all those things that have *not* been done—a tiny marine organism that costs us millions every year—simple, "impossible" things that are still to be accomplished.

The development of lighter and stronger alloys, permitting 3, 5, or even 10 horsepower for every pound of engine weight, instead of one-to-one . . . cheaper color photographs and faster engravings and better television . . . swifter ways of making and working new super-hard alloys . . . scores of different kinds of rubber "growing" on factory floors, and fuels 3 or 4 times as powerful as 100-octane gasoline . . . even solar energy, and atomic power, and—remember the barnacle! These are but a few from a list of certainties and possibilities as long as man's imagination.

Under the secrecy of forced-draught war research, many incredible accomplishments—seemingly impossible within our time—have already occurred. For obvious reasons, these may not be discussed, but of one thing we can be certain: The end of this war will inaugurate the greatest era of industrial surprises since the age of machinery began.

And the shift to light metals and plastics may be as consequential as the shift from bronze to iron!

We at Bryant have developed many new techniques during the past few months. Our engineers are working on hundreds of production lines today, helping to solve production problems involving the machinery of hard rubber, plastics, glass, graphite, cast iron and bronze, as well as forged, centrifugally cast and surface-hardened steels, light metals and alloys from a hundred new specifications.

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Work Sought for 643 Needy Plants

Cleveland

• • • **There are** known to be at least 643 distressed plants in the Ohio, Kentucky, West Virginia and Western Pennsylvania areas that make up the Fifth WPB Region, which will require $35,000,000 in contracts monthly to keep them from folding up. This number does not include 214 concerns that employed less than 10 persons in 1941 and which are for the most part repair and service shops.

While these statistics are not yet complete because about 300 returns have not been analyzed and another 200 or more firms have not been reached by the survey, returns that have been analyzed give the regional WPB and the regional Smaller War Plants Corp. an idea of the task that lies before them in helping these plants.

The task will not be quite as large as the $35,000,000 figure of monthly contracts needs indicate. Much of this will be obtained by the distressed plants through their own efforts, but it will be up to the SWPC to provide the balance. The program of the SWPC has been expanding since the first of the year in this area, placing an average of $2,500,000 a week in prime contracts.

The distribution of the distressed plants is:

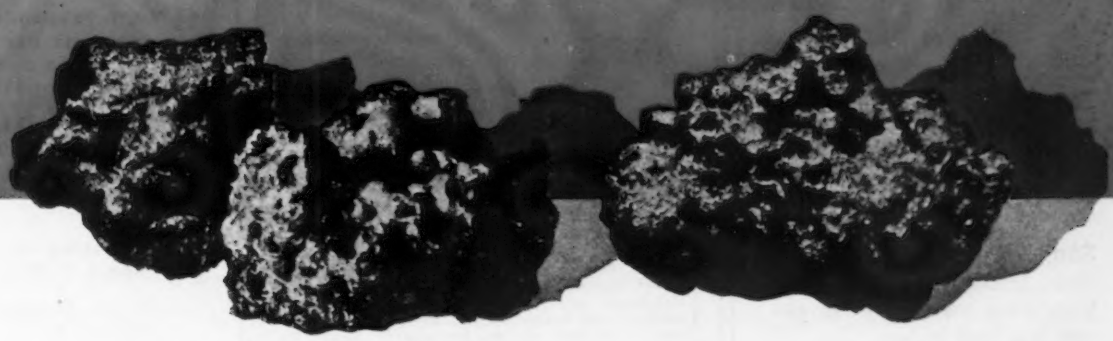
Districts:	No. Distressed Plants, May 1	Less Those Employing 10 or Less in 1941	Balance
Cleveland, Akron, Canton, Lima and Youngstown, Ohio, and Erie, Pa.	306	71	235
Cincinnati, Columbus and Dayton, Ohio, Charleston and Huntington, W. Va., and Louisville, Ky..	334	82	252
Pittsburgh and Johnstown, Pa., and Clarksburg and Wheeling, W. Va.	217	61	156
Total for region	857	214	643

Strike Costs 1½ Days of Production

Washington

• • • **Solid Fuels Administrator for War Harold L. Ickes estimated May 8 that temporary stoppage of work in the nation's bituminous coal mines during the week of May 1 reduced the normal weekly output by approximately 3,000,000 tons. This tonnage is equal roughly to a day and a half of normal production in recent undisturbed weeks.**

INCREASE PIG-IRON PRODUCTION BY *Ore Beneficiation*



THE graph shown above—an actual case history—is a typical example of the increased production obtainable through ore beneficiation. This increase is particularly important in meeting the war's demand for more steel—but equally important to your post-war economics are the efficient performance and lower cost-per-ton resulting from the use of properly beneficiated ores.

Your plant, equipped *now* for complete treatment of ore, will be in an advantageous position when competitive peacetime markets return.

Technical knowledge and broad experience in all phases of ore beneficiation are available to you in the McKee organization. McKee offers you *complete* engineering services for the efficient design and construction of plants and equipment for crushing, screening, concentrating, blending and sintering.

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Briefly Told—

Tip Given Employers By Selective Service; Diamond Dies Pile Up

• *Selective Service Bureau, WMC, emphasized recently that employers in war production or essential activities should file with local boards written evidence of employment of registrants maintaining bona fide homes with children less than 18 yr., born on or before Sept 14, 1942. Selective Service Form 42B should be used.*

•

• **Small-diamond dies, size 0.0015 and under, are being produced now at a rate in excess of current consumption and the nation's stockpile of these dies is slowly increasing, members of the Small-diamond Die Industry Advisory Committee were told at a meeting with WPB officials in Washington.**

•

• *The need for mica has not diminished despite reports that a substitute has been found. The Mica-Graphite Division, WPB, reports that several new materials with some characteristics similar to mica are in the process of development. However, none of the substitutes are produced beyond the scale of laboratory work.*

•

• *Contracts for the construction of 37 Liberty ships have been awarded to the New England Shipbuilding Corp., South Portland, Me., the Maritime Commission announced last week. Production schedules call for the delivery of 18 of the ships by the end of this year and 19 in 1944.*

•

• **The failure of a d.c. armature in a gear-motor threatened Revere Copper & Brass, Inc., Baltimore, with a production shutdown recently. On order with General Electric and ready for delivery to Bridgeport Brass Co. was a gear-motor with an identical armature. Bridgeport Brass Co. gladly offered the armature from the new gear-motor to Revere Copper & Brass, Inc., even though the switch delayed delivery of the gear-motor several weeks.**

•

• Dr. L. B. Sebrell, head of Goodyear Tire & Rubber Co.'s research department, expressed the opinion recently that the United States soon will be militarily independent of rubber from outside sources. He said research on synthetic rubber has progressed to the point that it can be converted into almost any needed war product.

•

• *Centrifugal machines for casting gun tubes are a new development at the Watertown Arsenal. By this process are made anti-aircraft guns ranging up to 90 mm., and other guns ranging from 37 mm. to 105 mm.*

•

• The majority of the new workers hired by airplane companies in the Buffalo area are women, executives report. At Bell Aircraft, 60 per cent of the new workers

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ARKEL, ANTON EDUARD van, ed.: Reine Metalle, Herstellung, Eigenschaften, Verwendung. Bearbeitet von zahlreichen Fachgenossen. Springer, 1939. Original Price: $20.00. Our Price: $12.50.

EUCKEN, ARNOLD, ed.: Der Chemie-Ingenieur; ein Handbuch der physikalischen Arbeitsmethoden in chemischen und verwandten Industrie-Betrieben. Akad. Verlagsges., 1932-1940.

Vol. 1: **Physikalische Arbeitsprozesse des Betriebes.** 4 parts; 1560p., 868 illus. Price for 4 parts: $45.00.

Vol. 2: **Physikalische Kontrolle und Regulierung des Betriebes.** 4 parts; 1145p., 865 illus. Price for 4 parts: $33.50.

Generalregister für Band, 1 und 2. iv, 99 p. Price: $3.50.

Vol. 3: **Chemische Operationen.** 5 parts: 2352p., 1168 illus. Price for 5 parts: $64.00.

Entire Set: Original Price $175.00. Our Price: $120.00.

NEUMANN, BERNHARD: Lehrbuch der chemischen Technologie und Metallurgie. 3., neu bearb. und erweiterte Aufl., unter Mitwirkung hervorragender Fachleute herausgegeben. Springer, 1939. 2 v., ix,v,1280p., 616 illus. Original Price: $38.50. Our Price: $28.50.

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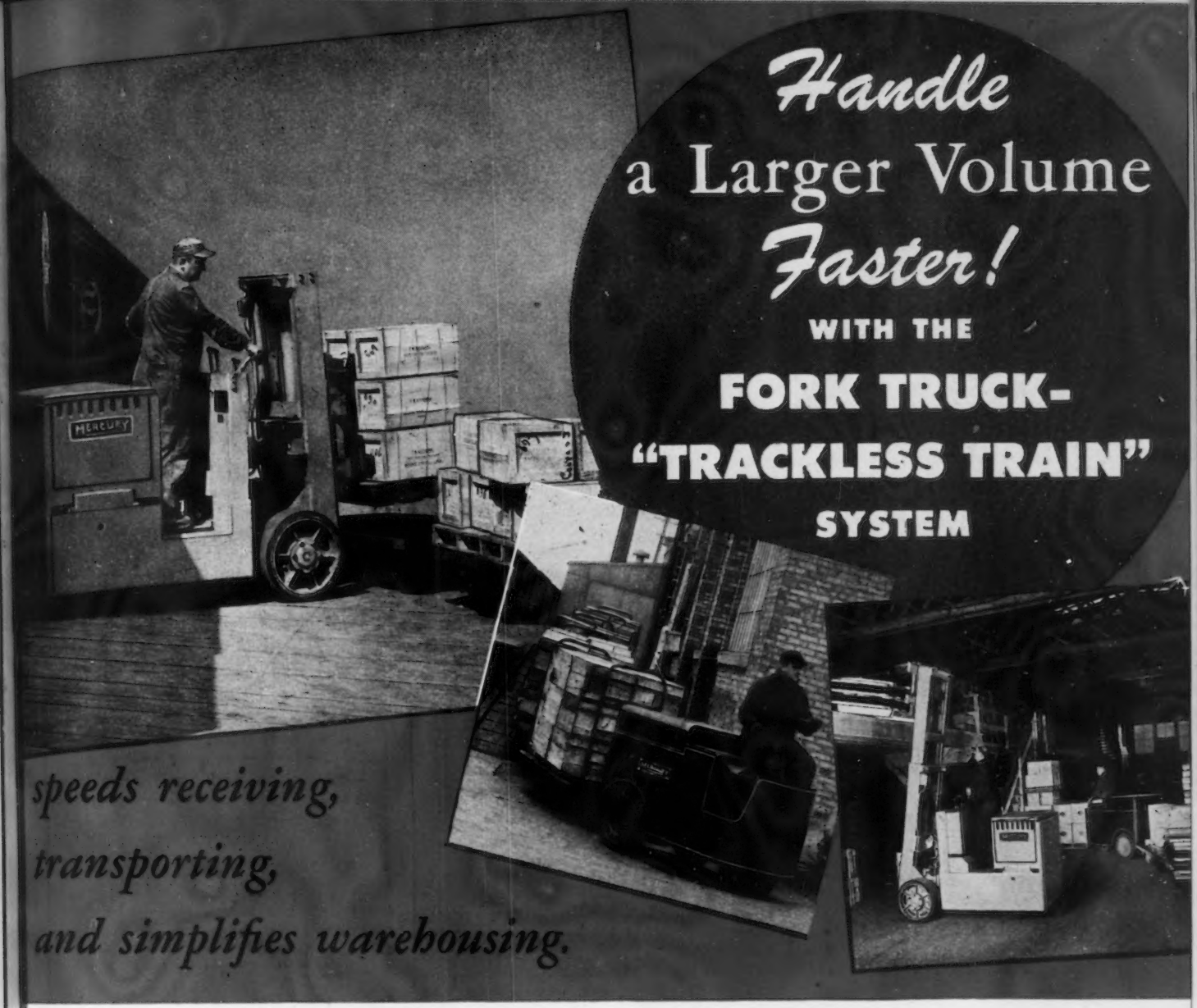

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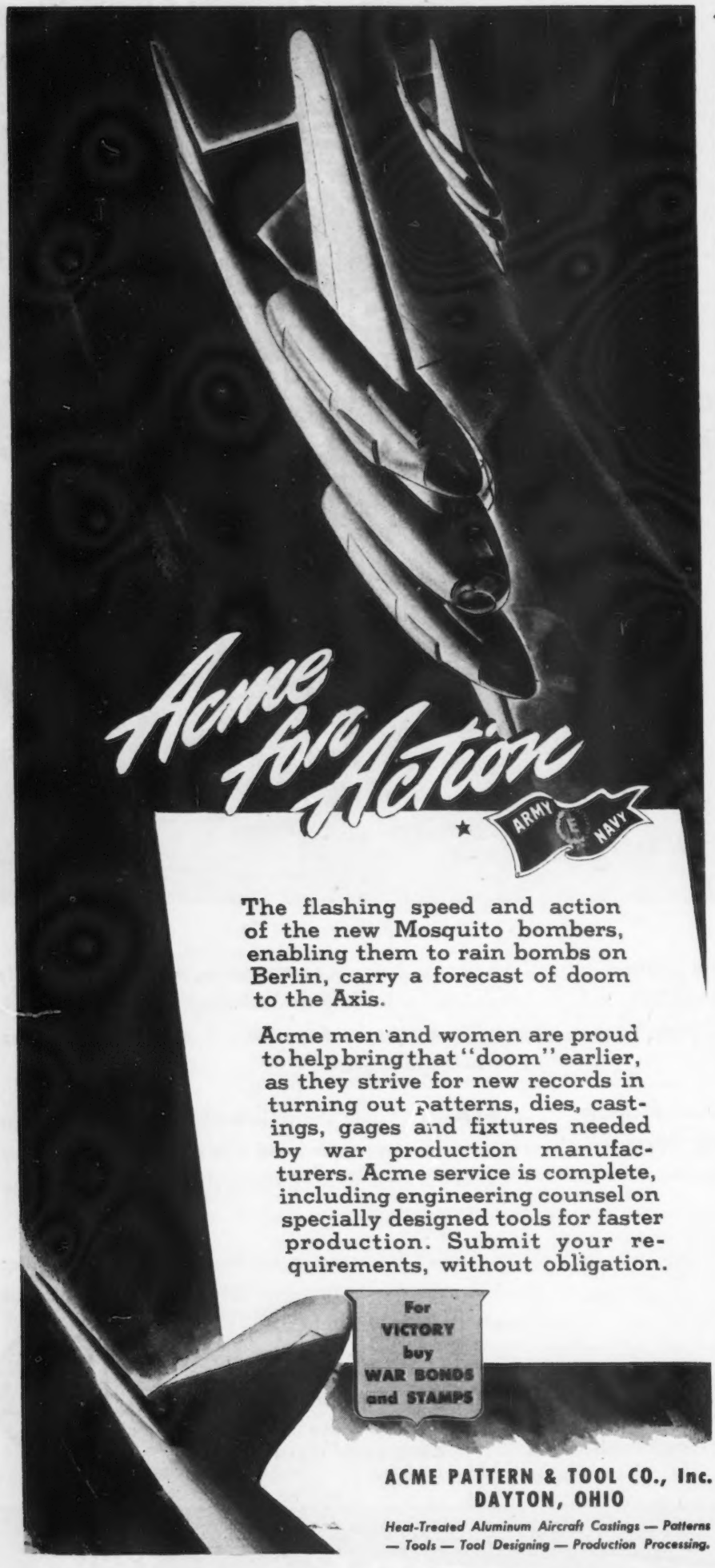
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are women. Curtiss-Wright reports 50 per cent of newcomers are women.

•

• Cooper - Bessemer Corp. reveals that Meehanite metal has replaced brass in the production of propeller castings for U. S. Coast Guard vessels. Use of Meehanite is said to have reduced propeller production costs almost 50 per cent, and conserved brass.

•

• With new war plant requirements tapering off, older plants will have an opportunity to augment their heavily loaded motive power with new locomotives, said F. H. Craton of General Electric, who has recently returned from a six months' leave with WPB. He added that under the new CMP stock locomotive production cannot be continued, and henceforth deliveries of locomotive will run from eight to ten months from date of order, instead of the four to five months as in the past.

•

• Canadian seaplane flyers have discovered a solution to the problem of ice spray collecting on the windshield of the planes. While the planes are at rest Lumarith plastic sheets, a product of the Celanese Celluloid Corp., are stretched across the windshields. When the flight is ready to begin, the sheets are quickly and easily peeled off, leaving a thoroughly dry windshield.

•

• Bell Aircraft Corp. has rescinded the nine hour shift at its Niagara Falls plant after several weeks' trial. Transportation and traffic problems plus effects of the long day on workers were reasons for discontinuance.

•

• The National Bureau of Standards has submitted to the trade for written acceptance a recommended commercial standard for materials for safety wearing apparel.

•

• Lukens Steel Co. has arranged a $10,000,000 V-loan credit for financing increased war production, Robert W. Wolcott, president, recently announced. Interest rate is three per cent per year on amount utilized, and a commitment fee of one-fourth of 1 per cent per year on the unused portion of the loan.

•

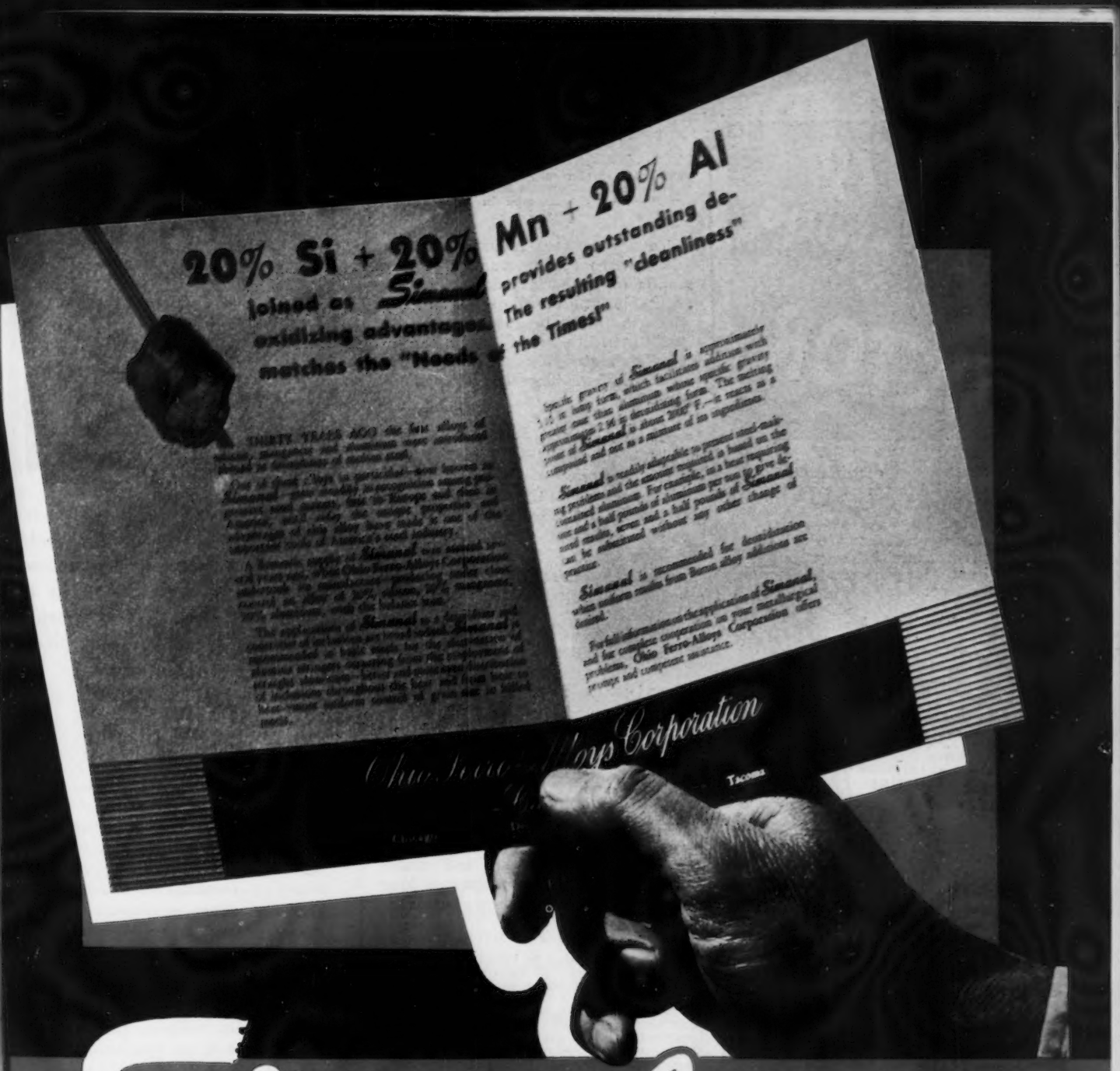
• "Vision Fulfilled," a five-reel motion picture in color telling the story of the production of tool steel and special steels in Canada, was presented at the Montreal meeting of the American Society for Metals. The picture was produced for educational purposes for Atlas Steels Ltd.

•

• War Production Drive headquarters has announced the award of 35 certificates of individual production merit and 81 letters of honorable mention to 116 war workers in recognition of ideas that improved production. American shipyard workers demonstrated that they are working for victory by winning 42 of the 116 honors. They accounted for 18 certificates, and 24 letters of honorable mention.

•

• Follansbee Steel Corp. reports for the quarter ended March 31, 1943, net earnings of $187,133 after all charges including U. S. income and excess profits taxes. This is equal to 71 cents per share on common capital stock after provision for dividends on 5%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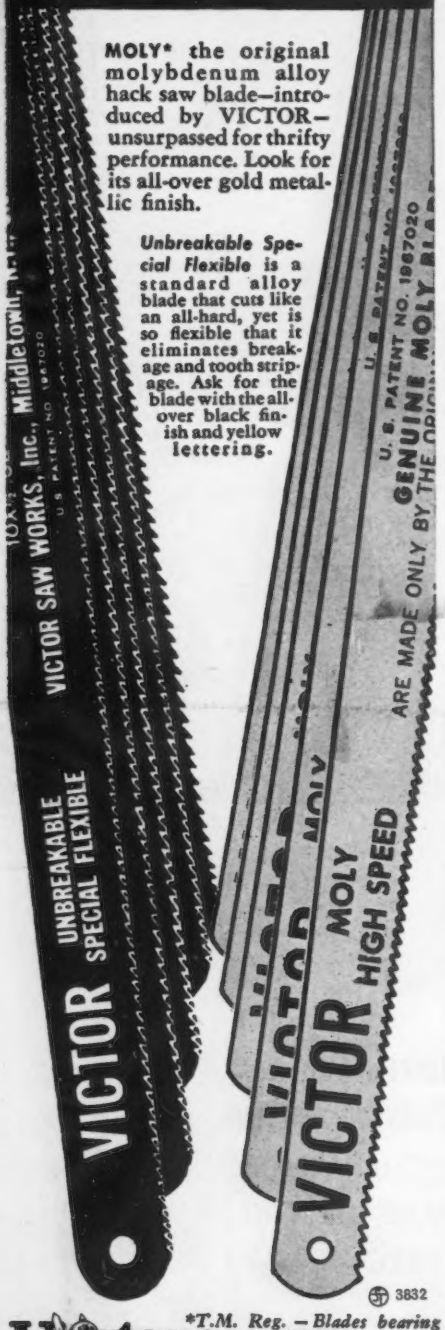
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cumulative preferred stock. This compares with net earnings of $130,308 equal to 45 cents per share on the common in second quarter of 1942.

•

• To try to help industrial and civilian users of the smaller sizes of manila rope who may have remaining no usable rope or who are using rope which is unsafe because of wear, the Chain Institute, Inc., Chicago, has just completed studying the proper substitution of weldless chains for manila ropes.

•

• Extension of the 20-in. petroleum products pipeline from Seymour, Ind., to the harbor area of New York will be financed by DPC, it was announced last week, and is expected to be completed by the end of the year.

•

• Changes in railroad traffic flow, produced by war developments, have increased the average length of haul of each freight car by 16 per cent, Henry F. McCarthy, director of the division of traffic movement, ODT, pointed out in an address recently at Boston.

•

• Declaring that while it is true that the supply of pig iron and scrap is limited, Joseph F. Wilber, director of the WPB Plumbing and Heating Division, said last week that the installation of cast iron soil pipe and fittings for sanitary drains in and under buildings should be continued as long as the supply of raw materials is available.

•

• Are you interested in booklets currently being distributed? Following are some which may be of value to you: "Machinery Steel Selector," put out by Horace T. Potts Co., Philadelphia; technical report on bright zinc plating as a substitute for cadmium plating, issued by Turco Products, Inc.; "Simplified Practice Recommendation R8-42, Range Boilers and Expansion Tanks," obtainable from Superintendent of Documents, Government Printing Office, Washington, D. C.; "Standards for the Protection of Workers in Gas and Electric Welding," issued by Division of Labor Standards, U. S. Department of Labor, Washington, D. C.; "Lady, Will You Give a Lift?" (for breaking in women drivers on industrial trucks), published by Elwell-Parker Electric Co., Cleveland; "How to Make Your Safety Equipment Last Longer," put out by Mine Safety Appliances Co., Pittsburgh; catalog of publications and patents for 1941-42, published by Battelle Memorial Institute, Columbus, Ohio; "Bibliography of Indium," put out by the Indium Corp. of America.

•

• The Bessemer, Ala., plant of the Central Foundry Co. has been closed down due to lack of orders for cast iron pipe which the plant manufactures. Approximately 350 men were affected.

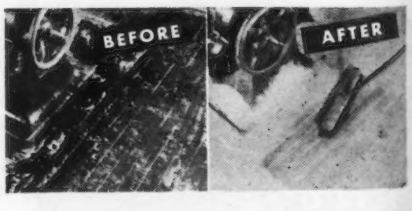
•

• Redistribution activities of WPB are speeding idle and excessive inventories into direct war uses. Representatives in the WPB field offices filled 6821 requests for materials or equipment in the first three weeks of April. The largest number was reported from Cleveland, where the total was 2256. The Philadelphia office received 1202 requests and filled 1137. 400 requests were filled by offices in Dallas, Detroit, Chicago, Kansas City and San Francisco, and more than 300 by Boston, New York and Minneapolis.

Hundreds of accidents, thousands of lost production-hours, millions of unnecessary expense-dollars have been ended by a new, magic carpet for industrial plants — Speedi-Dri. Your plant can now end the menace of greasy floors — while you save the cost of scrubbing them — by spreading Speedi-Dri.

Speedi-Dri is a fire-proof, skid-proof absorbent for removing grease and oil from floors. It literally pulls oil discolorations from wood, concrete, and steel. It provides a non-slip surface as it does so. It is a non-combustible fire-resistant. It is absolutely harmless to personnel or machinery, brightens up the plant, is easy to sweep up.

Join the leading war-production plants of America in spreading Speedi-Dri on oily floors to prevent accidents, remove fear, and retard fire. Where there's also water, or soluble oils are found, use Sol-Speedi-Dri. Prompt service from warehouse stocks in leading cities.



Ask for demonstration or write for a generous free sample of Speedi-Dri.

SPEEDI-DRI
OIL AND GREASE ABSORBENT

SUPPLIERS
East — REFINERS LUBRICATING CO.
New York City
Midwest and South
WAVERLY PETROLEUM PRODUCTS CO.
Philadelphia, Pa.
West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Menlo Park, Calif.

There IS a Difference in Welding Electrodes!

LET no man tell you that welding electrodes are as alike as tenpenny nails. Such is not the case.

We think our experience in welding entitles us to speak frankly and with authority on this subject. Every product we manufacture is a *welded* product—and all of the electrodes used in our shops are of our own manufacture.

In order to provide the characteristics, the uniformity, and the quality required of electrodes for our production standards, we found it necessary to establish what we believe to be the most rigid and thorough system of laboratory testing and control known to the industry. This system governs *every operation* in the manufacture of SMITHway Certified Welding Electrodes—all the way from metallurgical, chemical, and physical analysis of raw materials to final inspection of coating, brushing, and concentricity.

We have proved to our own satisfaction that final results justify these *extra* precautions!

We believe that we can also prove the plus-value of SMITHway Certified Welding Electrodes to you . . . prove it in the quality of every finished weld—and in the time and material cost of making it.

Mild Steel . . . High Tensile . . . and Stainless Steel

WELDING ELECTRODES

Made by welders . . . for welders

A. O. SMITH *Corporation*

MILWAUKEE • WISCONSIN • HOUSTON • TEXAS

Industrial Sales Up 23% in 1942; Taxes Take 60c on Dollar; Nets Fall 16%

New York

• • • **A private survey** of 495 industrial corporations revealed that tax provisions in 1942 took an average of 60c. out of every dollar of taxable income and that while gross sales were up an average of 23 per cent over 1941 levels net incomes had decreased in all industries an average of 16 per cent in the same period after all deductions, according to data prepared by the National Industrial Conference Board.

Fifteen aircraft companies held the top of the range with a sales gain of 167 per cent over 1941, and the railroad equipment group increased sales by 116 per cent. Sales were 31 per cent higher for 254 durable goods concerns than in 1941.

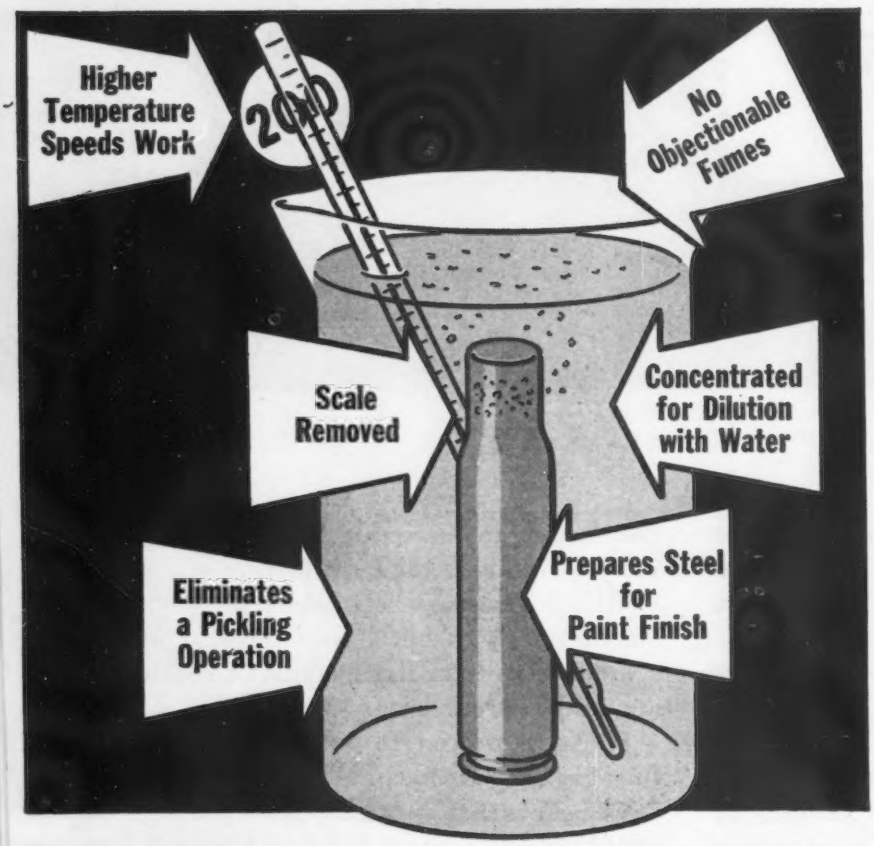
The rise in total income, before reserves, was less steep, as higher operating costs, conversion costs, higher prices of raw materials, higher wage rates, and overtime payments combined to cut deeper into the sales dollar. However, all industries except two reported gains in taxable income.

Reserves set aside to meet the federal tax bill, $3,913-million in 1942, were fully 50 per cent greater than in 1941 and more than ten times the 1939 provision made by these 495 companies. Individual reserves ran as high as 77c. in the automobile parts industry and 75c. in the steel and iron group. Aircraft, machinery, and railroad equipment concerns also reported reserves 70 per cent or more of total income, whereas in 1941 the highest percentage was set aside by aircraft corporations, at 65 per cent of total income.

An increase of 63 per cent in total income of the aircraft industry was reduced to only 3 per cent after taxes. Railroad equipment earned 112 per cent more, before taxes, in 1942 than in 1941, but net income available for dividends rose less than 0.5 per cent. These were the only two manufacturing industries to report any increase in after-tax income.

Thirty-seven steel companies, representing $5.3 billion in total assets, the largest industry group, reported a decline of 32 per cent in net income after taxes last year, in spite of increases of 21 per cent and 14 per cent, respectively, in sales and total income.

For 36 mining companies tabulated, tax reserves averaged only about 47 per cent of gross income. The gain of 8 per cent in gross income in 1942 was changed to a decline of 6 per cent after taxes, a more moderate movement than among the manufacturing groups.



"DEOXIDIZE" for varnish finish with the

New "170" type ACP DEOXIDINE

Whether you are preparing steel artillery shell cases, or any other metal product (except zinc) for varnish or paint finish you should investigate the new "170" type DEOXIDINE. For use in a dip operation, at either high or low temperature, to remove light annealing scale—thus eliminating an extra pickling bath—and also to perfectly prepare the surface for the paint finish, all in one simple operation.

Samples and directions for use sent upon request.

Manufacturers of Inhibitors and Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.

MAIN OFFICE AND WORKS AMBLER • • • PENNA.

ACP

CHEMICALS ACP PROCESSES

DETROIT, MICH., 6335 Palmer Ave., E. CANADIAN BRANCH WALKERVILLE • • • ONT

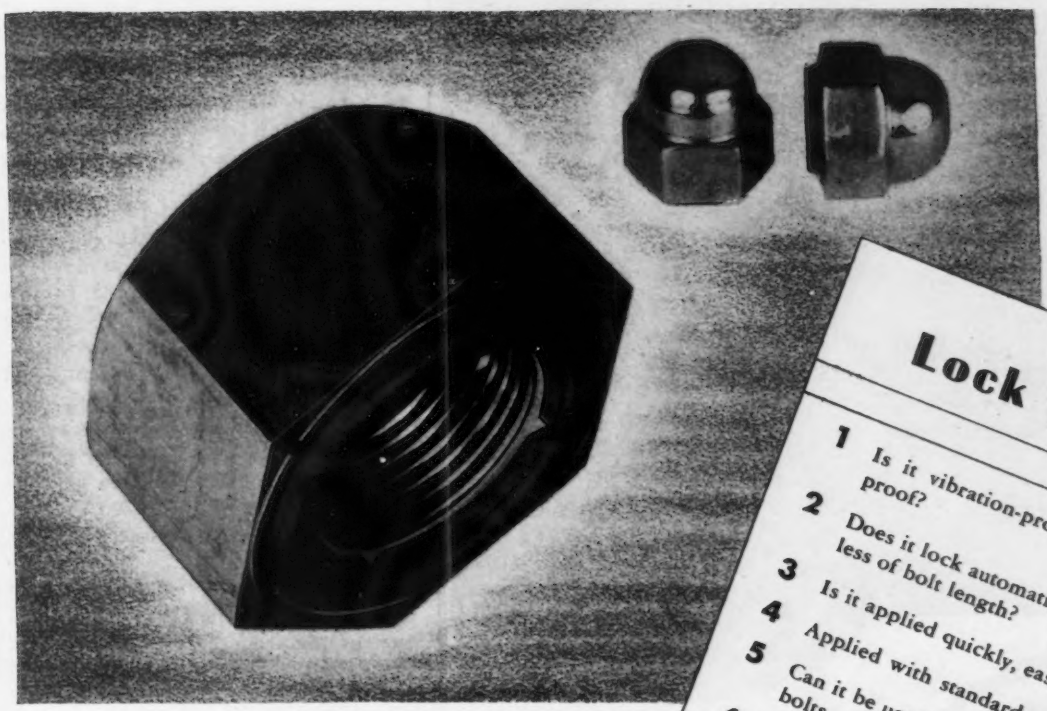
WPB Forms Rail Steel Mill Industry Advisory Committee

• • • The director of industry advisory committees of WPB last week announced formation of the rail steel mill industry advisory committee. Members include:

H. P. Bigler, Connors Steel Co., Inc., Birmingham; F. G. Carrel, Franklin Steel Works, Franklin, Pa.; M. A. Dowling, Northern Steel Co., Boston; Boyd Jack, Calumet Steel Co., Chicago; D. C. Schonthal, West Virginia Rail Co., Huntington, W. Va.; Joseph H. Verschleiser, Laclede Steel Co., St. Louis; A. C. Weihl, Pollak Steel Co., Cincinnati. William F. Vosmer is the government officer.

Check all points...

when comparing Lock Nuts!



Today's lock nut has a complicated job. *Safety*—on which machines or even lives may depend. *Locking security*—proof against vibration, impact, and shock even when re-used many times. *Speed of application*—to advance the swift wartime tempo of assembly and field servicing. . . . And other primary and specialized tasks now often assigned to lock nuts.

Almost invariably the all-metallic, one-unit An-cor-lox lock nut will meet *any combination* of requirements. Think it over!

Your Lock Nut Quiz

	Yes or No
1 Is it vibration-proof and shock-proof?	
2 Does it lock automatically regardless of bolt length?	
3 Is it applied quickly, easily?	
4 Applied with standard wrenches?	
5 Can it be used on standard length bolts...sawed-off or drilled bolts?	
6 Is it re-usable many times?	
7 Usable on high temperature jobs?	
8 Will it damage bolt or work?	
9 Can it be made of various metals to meet specific conditions of corrosion, heat, strength and other factors?	
10 For the job it does, is it reasonable in price?	

Write for An-cor-lox Bulletin.

NOTE: *An-cor-lox scores with a "Yes" on all points.*

An-cor-lox

TRADE MARK REG

Lock Nuts

An-Cor-Lox Division
LAMINATED SHIM COMPANY
Incorporated
76 Union Street – Glenbrook, Conn.

Wyckoff production soldiers pledge their all-out effort for Victory!

A second star has been added to our distinguished Army-Navy production award!

Wishful thinking never won a marble game or a great war. Only the will and the ability to "Do the Job" has won six American Wars. To help keep our coveted freedom, the contribution of every Wyckoff production soldier will be to do the very best job of "passing war-vital steel" until Victory is won!

WYCKOFF
DRAWN STEEL COMPANY

Iron Ore Shipping Goal On Great Lakes Cut To 91,000,000 Tons

Washington

• • • **The 1943** lake iron ore shipment goal which originally had been set at 95,000,000 tons but later was reduced to 94,000,000, has been further slashed to 91,000,000 by WPB. Advice to this effect has been conveyed to ODT by WPB Chairman Donald M. Nelson. The cut is attributed to the lateness in opening the lake season, together with the demands of industries other than steel for the use of lake carriers to transport coal, grain and other commodities.

On May 15 the blast furnace of the Riddlesburgh Iron & Steel Co., Riddlesburgh, Pa., will be shut down by WPB order. It is said the furnace which produces 5500 tons of pig iron monthly, will be closed down for the duration. However, the coal mine and coke ovens will remain in operation.

The reason the furnace is being put out of operation, WPB says, is that the iron has been used to produce pressure pipe. It is claimed that the iron is not suitable for steelmaking as the ores melted in the furnace are high in silicon and that to offset this characteristic would make the production of pig iron for steelmaking cost too much. Likewise, the location of the furnace, according to WPB, would make transportation costs to steel plants prohibitive.

The company employs 300 workers, and WPB estimates that about one-half of these will be retained to work in the coal mines at the ovens. Of the remaining employees many are said to have already secured jobs.

•

April Movement Was Low

Cleveland

• • • **A very poor** showing was made in April for downlake shipments of iron ore, with a total of only 1,954,817 gross tons shipped from upper lake ports. This compares with 7,857,106 gross tons, the revised shipments total for April, 1942. The only shipments this year were in April, whereas 792,602 tons were transported in March last year.

In examining the shipments, 29.68 per cent of the April, 1943, ore shipments came from the port of Escanaba, Mich., whereas normally shipments from Escanaba range between 5 and 8 per cent of the entire downlake ore movement. Superior, Duluth, and Two Harbors, which combined usually account for about 80 per cent

of the total monthly shipments, only accounted for some 58 per cent of the April shipments.

•

Furnace's Start Is Delayed

Buffalo

• • • **Delay** in lighting a new government-owned blast furnace at Bethlehem Steel Co., Lackawanna, was caused by the failure of ore-carrying boats to navigate through heavy fields of slush ice off the Port of Buffalo last week. The Lackawanna plant received its first boat load of ore May 4, nearly a month after the hoped-for opening of Lake Erie navigation. While the plant had enough ore on hand to keep other blast furnaces going, stocks were such that operation of the new furnace would have been difficult under existing conditions.

•

ODT Restores Permit Requirements

Washington

• • • **In an effort** to offset the weather-enforced late start, ODT has restored its permit requirements which allow preferential treatment of ore cargoes on the Great Lakes. When the permit requirements were suspended, due to the delay by the late thaw of the upper lake navigation, carriers were given virtual freedom to move coal, grain and other traffic.

Monarch Net Profit Is Lower

Sidney, Ohio

• • • **The Monarch Machine Tool Co.** showed net profit for 1942 of $1,106,030 after all deductions, according to the company's annual report. This compares with a net profit of $1,500,424 for 1941. Earnings per share for 1942 were $5.27 as against $7.14 in 1941.

Sales for 1942 totalled $30,377,642. Provision for federal income taxes, less postwar refund of $1,025,945, was $9,676,566. In his statement to shareholders and employees, Wendell E. Whipp, president of Monarch, says:

"This year at Monarch we have put aside $2,500,000 as the very minimum we should earmark for contingencies and provide for the inevitable postwar adjustments. These 'back-to-peace' provisions are urgently required since Monarch, in co-operating unreservedly with the war production program of the government, has built enough lathes to limit materially the scope of its sales for many years to come."

Let LAMSON do the moving!

In the production of shell-cases, for instance, Lamson Conveyors are saving vital manpower all along the line. From raw material to finished product, through machining, heat-treating and inspection operations, Conveyors have eliminated wasted hours of unproductive handling. In one ordnance plant alone the rough forgings enter on Lamson V-Type Gravity Conveyors, are moved through 27 operations in the plant, and into the freight cars. When you realize that these cases weigh 140 lbs. in the rough and emerge completed still weighing 75, you know that they are too heavy, and go through too many operations to be moved by hand for fast production. But Lamson doesn't stop here — even on battlewagons our Intermediate Hoists and Conveyors pass these shells to their ultimate destination against the Japs!

Write for new Wartime Conveyor Bulletin IA

Overhead and out of the way, this conveyor cools shell-cases for the next operation.
LAMSON CORPORATION
Syracuse, N. Y.
Makers of Conveyors and Pneumatic Dispatch Tubes

Inland Refutes Mine Wage Charges; Denies Sub-Standard Living Basis Exists

Chicago

• • • **Wilfred Sykes, president** of the Inland Steel Co., challenged implications that the families of coal miners, generally, exist on a sub-standard basis; that "the children of the miners are hungry."

The Inland coal mine at Wheelwright, Ky., had 24 working days in February, Sykes explained, having been on a six-day basis long before the current dispute. "We employed on straight day rate in February 783 men in eight classifications. The lowest paid group, consisting of 63 men, were employed at surface labor outside the mine, and a full time worker received $156 for the month. The lowest paid group inside the mine contained 165 men, and for full time received $175. The highest paid group received $234. The weighted average of all men working day rate and full time was $183.

"We employed 429 coal loaders in February on a piece-work basis. Only 69 worked the full 24 days. They earned an average of $10.72 per day or $257.28 for the month. Three hundred and sixty of the coal loaders averaged only 19 days per man. On that basis they earned an average of $178.98 for the month."

Sykes revealed that of 41 "machine men" employed during February only six worked the full 24 days. They earned an average of $16.90 per day or $405.60 for the month. Individual earnings of such men, he explained, varied from $323.10 to $505.52 for the month. Only 15 days of work would still earn $236.70 for the month.

NOW! IT'S HERE

A NEW SENSATIONAL DESIGN FOR leather V-BELTS

Schieren engineers, after years of research, have discovered the way to provide the tenacious pulling power of flat leather to V belts. Flat leather side walls which grip the sheaves of the pulleys permit the belt to run slack, give longer life and reduce wear on bearings and machinery.

Two years of actual service under wartime pressure have proved the value of this invention in V leather belting.

The new Schieren V Belt eliminates the need for a huge inventory of thousands of sizes and lengths heretofore required for replacement purposes. Supplied in rolls. Cut the length you need, and make your own V belts endless. The Schieren New Method also provides the means to do this job right on the pulley and save the hours always lost in shutdown periods.

MODERN DESIGN
SCHIEREN
ALL LEATHER V BELT
PATENT APPLIED FOR
Supplied in rolls. The three standard sizes A, B and C will meet your V belt requirements. Note flat leather side walls that provide the grip.

WRITE FOR THE COMPLETE DETAILS

CHAS. A. SCHIEREN COMPANY
36 FERRY STREET, NEW YORK, N. Y.
60 FRONT STREET, W., TORONTO, CAN.

SCHIEREN BELTING TRADE MARK

LEATHER BELTINGS • SPECIALTIES AND HYDRAULIC PACKINGS

CHICAGO - SALT LAKE CITY - LOWELL - DENVER - DALLAS
NEW YORK - PITTSBURGH - PHILADELPHIA - NEWARK

Trade Notes . . .

Micromatic Tool & Mfg. Co. has been organized at Milwaukee by E. G. Schwibinger, J. L. Hintz and C. W. Danielson.

•

The Ad-Lag Co. has been formed at La-Crosse, Wis., by T. R. Crouts, R. E. Matson and E. A. Chinander to manufacture a new pulley lagging material.

•

New York Monotype Co., now known as Monotype & Linotype Composition Corp., is operating a complete trade composition plant at 461 Eighth Avenue, New York.

•

Sylvania Electric Products, Inc., Salem, Mass., will open a sales office in the Lincoln-Liberty Building at Broad and Chestnut Streets, Philadelphia, June 1.

•

Tool Engineering Service, 305 N. 22 Street, Birmingham, Ala., are newly formed dealers in standard and special machinery, tools, gages and industrial equipment.

•

Construction Sales Co., Inc., Albany, N. Y., has opened a branch office at 50 Broad Street, New York. The office of the president has been moved to 2109 Terminal Tower, Cleveland, Ohio.

•

Ricewood Corp. has become a subsidiary of Cardox Corp. and will be known from now on as Cardox Western, Inc. The general office will remain in Los Angeles.

•

Mexican Government Railway System announces that R. E. Martinez has assumed the office of material agent at 120 Wall Street.

•

The Wean Engineering Co., Inc., recently moved its offices from the Second National Bank Bldg., to its recently acquired building at 347 North Park, Warren, Ohio.

Use of Manning Tables in Steel Outlined at Production Conference

Cleveland

• • • At the production conference of the American Management Association, held May 5 and 6 in Cleveland, a theme of "New Manpower Through Better Production Methods" was carried throughout the various forum-type meetings. Production problems, manpower, the CMP and operation under it, incentive wage systems, union-management cooperation, time study engineers, employee training, and Manning and replacement tables for draft-liable personnel, were among the topics discussed. Leaders in each of the fields who were associated with manufacturers throughout the country spoke of the various subjects and then threw the meeting open to a forum type discussion.

Notable among the meetings was one led by R. J. Greenly, acting chief of the personnel division of Carnegie-Illinois Steel Corp., Pittsburgh, who spoke on the "Application of Manning Tables." Many of the draft problems, how Manning and replacement tables can be tabulated, and the coordination of efforts of the employer and the draft board were subjects discussed.

Brought out in the discussions of the paper were the possible benefits other than selective service possible from Manning tables. For the first time training and personnel directors will have a personnel inventory. The post-war values of such a program are almost unlimited, since the qualifications of every employee in a plant will be on hand. It was also brought out that such information will lead to a new type of management in industry dealing with properly fitting personnel to most adaptable jobs.

The success of Manning tables lies in the honest answers from the employee in regard to his selective service status. Carnegie-Illinois Steel Corp. has a "manpower questionnaire" designed to get the correct answers from every employee. Coordinators are appointed at each plant to see that the employee files a questionnaire, and a man in each department is appointed to offer personal help in filling in the questionnaire. From these questionnaires, Manning tables, replacement lists, and replacement summaries are figured.

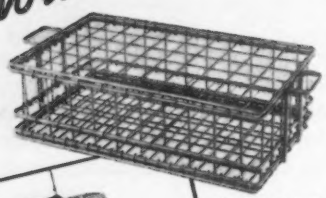
The questions covering the employee's name and number, department name and number, and the employee's social security number are filled in from stencils on file by the accounting department. The personnel department then fills in the employee's work classification based on American Iron & Steel Institute and Department of Labor job classifications, total time experience at job both in and out of the company, months service with the company, date of birth, race, sex, and citizenship. The questionnaire is then sent to the department representative for distribution to the employees. The employee fills in his marital status, number of children under 18, dependents, present draft status, date of classification, date of deferments and date of deferment expirations, order number, board number, and address of local board. All of these questions are answered on the basis of latest official interpretations of the selective service. When the employee checks the other data on the questionnaire, he signs it and it is returned to the accounting department where it is put on I.B.M. cards for tabulation. The replacement summary, replacement list, and Manning tables are then made up from these questionnaires.

Mr. Greenly stated that the entire steel industry, headed by the American Iron & Steel Institute, has adopted this unified system.

FUEL OIL
NATURAL GAS
TIME IS SHORT!
Change to the Victory Fuel now!
AMCO
PULVERIZED COAL
Systems
with automatic control
for HEATING MELTING AND ANNEALING
Fuel oil and gas must be replaced now with pulverized coal, if operations are to continue at their present record rate. • AMCO is prepared to furnish complete Pulverized Fuel Systems for all types of furnaces in the Steel and Non-Ferrous Industries.
The AMSLER-MORTON Company
FULTON BUILDING · PITTSBURGH, PA.

Faster "UNIT HANDLING" With WIRE BASKETS

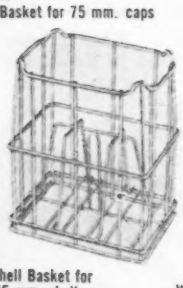
● Union Steel Wire Baskets are being used in war plants to organize production—to handle complete lots in a basket as single units. The object is speed. Stacking type baskets also conserve floor space. Let us see what can be done to speed up some department of your business. Write for illustrated bulletin.



Cap Basket for 75 mm. caps

Shell Case Basket for 40 mm. cases

Heat Treating Baskets



Shell Basket for 75 mm. shells

Wash Basket for 3" Cartridge Cases

Wire Parts for War Use

These are only a few of the many wire parts being used for war purposes. Write, Wire or Phone (Albion, No. 147) for quotations or further information on Wire parts or products (woven, welded or formed).

UNION STEEL Products

UNION STEEL PRODUCTS COMPANY
442 Pine St., Albion, Michigan

ALLOY

S.A.E. HY-TEN N. E.

STEELS

We Solicit Your Inquiries

Even though warehouse stocks today are not as plentiful as you and we would like there are still a substantial number of sizes in a variety of analyses available for immediate shipment. We will do everything within our power to help you make the guns and tools and ships and planes and tanks which will win the war.

WHEELOCK, LOVEJOY & CO., INC.

Main Offices 126 Sidney Street, Cambridge, Mass.

Cleveland, Chicago, Newark, Detroit, Buffalo, Cincinnati

Three Months' Output In Canada Shows Drop

Toronto

• • • **Production of** iron and steel in Canada in March showed a gain over February, but for the first three months this year output dropped below the corresponding 1942 period. The loss for the first quarter this year was chiefly because two major steel plants were out of production two weeks in January.

For March pig iron production totalled 160,101 net tons, a gain of 15.8 per cent over the 138,240 tons, the revised total for February. For three months ending March 31, cumulative pig iron production totalled 414,668 net tons which is 14.39 per cent under the 474,245 tons produced in the corresponding period of 1942.

Production of steel ingots and castings in March amounted to 270,962 net tons which compares with 245,588 tons in February and 265,903 tons in March a year ago. Output included 254,207 tons of ingots and 16,755 tons of castings. For the three months ending with March production totalled 723,558 tons against 767,840 tons in the first quarter of 1942.

Strike Hits Warner & Swasey

Cleveland

• • • **A sitdown strike** involving about 100 employees of the Warner & Swasey machine shop occurred Monday evening. The strikers milled around the plant for about an hour and were ordered either to return to work or leave the plant. While some workers returned to work, the majority left the plant. However, on the change of shift at midnight, a full crew reported for work.

The strike was denounced by an AFL business agent as a wildcat and unauthorized work stoppage and is supposed to have started as a protest against a company rule that allows a 5 per cent bonus for night work only to employees in service a year.

Negotiations for the annual renewal of the union contract have been under way for some time and the company reported that the strike was in reality a by-product of the failure to consummate negotiations and have the contract agreed to by both the union and the company. Union representatives last night urged the men to return to work.

PAINT THAT STAR WELL, MISS . . .

. . to millions of conquered people it's the symbol of liberation

● Even where the heel of the Axis oppressor grinds deepest there are still men who dare to hope. Conquered men who nightly look to the sky for the *flying star* that tells them help is coming . . . the flying star that identifies the war planes of the United Nations.

Like most man-made signs, this is a *painted* star. But in mass-producing planes for America and its allies, U. S. manufacturers can't slow down for tedious hand-painting. So today, hundreds of efficient little ladies, like the one shown above, are busy *spray-painting* this symbol of liberty on each plane—with modern DeVilbiss Spray Equipment.

This is only one of *many* ways DeVilbiss Equipment is helping America's great aircraft industry to "get 'em there—sooner". DeVilbiss Spray Systems save time in wing doping, in finishing fuselages, motors, and accessories, in caulking seams, cementing fabric parts, and coating engines with grease for overseas shipment.

Today, in *all* fields of war production, from bullets to battleships, DeVilbiss Equipment is saving precious time wherever there is a painting, coating, or finishing operation. And tomorrow, when this war has been won, you can look to DeVilbiss for new spray techniques and equipment that will provide even faster, more efficient finishing for the better peacetime products America will have a right to expect.

THE DEVILBISS COMPANY • TOLEDO, OHIO

Canadian Plant: WINDSOR, ONTARIO

PROUD to have won the coveted Army-Navy "E" for excellence in war production, the men and women of DeVilbiss pledge to continue giving their all-out best—for Victory.

DEVILBISS SPRAY SYSTEMS

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

Absenteeism Guide

Adapted from WMC chart

CAUSES		CURES	Agencies Available for ASSISTANCE
ILLNESS	Labor-Management:	Sets up 1—a health education program Sets up 2—recreational facilities	Municipal and State Department of Health and Industrial Hygiene;
	Management:	Directs persuasive health education campaign, including periodic check-ups, employment of industrial nurses, study of environmental causes of illness.	County Medical, Dental and Nurses Associations; and
	Trade Union:	Assists Labor-Management Committee in carrying out its health campaign. Adopts a medical care plan where possible.	Industrial Hygiene Division of the U. S. Public Health Service.
	Community:	Provides sufficient numbers of doctors and dentists near war plants.	
FAULTY PRODUCTION PLANNING	Labor-Management:	Promotes suggestion procedure to channel worker suggestions for bettering production.	Manpower Utilization Division of the War Manpower Commission;
	Management:	Anticipate problems and eliminate bottlenecks; establish channels to clear suggestions from employees for better flow of production.	Labor Production Division; War Production Board.
HOUSING	Labor-Management:	Works with community on housing plan.	Local Chambers of Commerce;
	Management:	Works with community on housing plan.	
	Trade Union:	Advises workers.	
	Community:	Promotes campaign to provide accommodations for existing homes for war workers and their families. Plans with appropriate public and private agencies to assure provision of ample new housing units.	Local housing officials and local representatives of the National Housing Agency; New York State Division of Housing; Realtor Associations.
TRANSPORTATION	Labor-Management:	Sub-Committee devise plan with community and transportation companies.	Local transportation companies;
	Management:	Develop "Share the Car" Program, provide charts in personnel office showing transportation means for each worker.	Employer and Trade Associations; Board of Education;
	Trade Union:	Cooperates with community and employers in proper program.	Transportation, the Office of Defense Transportation;
	Community:	Makes study of flow of traffic, re: schedule buses and trolley cars, work with Transportation Council of plant to coordinate activities.	New York State War Transportation Committee of State War Council.
WORKING CONDITIONS	Labor-Management:	Makes recommendations for improving sanitary facilities, light, ventilation, heat.	Municipal and State Departments of Health and Industrial Hygiene; Industrial Hygiene Division of the U. S. Public Health Service; New York Public Utilities Companies; and Division of Labor Standards of the U. S. Department of Labor.
	Management:	Takes corrective steps wherever possible.	
POST PAY DAY	Labor-Management:	Interviews all chronic absentees, tells fellow workers cause of their absence.	Banks, department stores and local merchants; War Council, Recreation Organizations; Y. W. and M. C. A.'s; and other agencies conducting recreation and social activities; Department of Parks.
	Management:	Change pay day to mid-week, or stagger pay days throughout week where possible.	
	Community:	Develops wholesome recreational facilities and adequate housing facilities for families of workers.	
SHOPPING	Labor-Management:	Sub-Committee working with community establishes convenient shopping centers and hours.	Chambers of Commerce:
	Management:	Cooperates with community and employers in arranging to keep stores open.	Employer and Retail Trade Associations;
	Trade Union:	Cooperates with community and employers in arranging to keep stores open.	War Councils;
	Community:	Merchants set up grocery stores, department stores, and beauty parlors in or near factories, serviced at hours convenient to workers. Establishes "Volunteer Shoppers" program.	Local representatives of the Office of Price Administration; War Production Board.

Directory of Regional Offices—War Production Board

(KEY TO ABBREVIATIONS—RD, Regional Director; DM, District Manager; ADM, Acting District Manager.)

REGION 1—BOSTON, MASS.

W. H. Wheeler, Jr., RD, 17 Court St.

Connecticut:
- Bridgeport: Raymond L. French, DM, 144 Golden Hill St.
- Hartford: Earle L. Milliken, DM, 119 Ann St.
- New Haven: Charles A. Newton, DM, 152 Temple St.

Maine:
- Portland: Edwin C. Hyde, DM, 142 High St.

Massachusetts:
- Lowell: William B. Stanwood, DM, 8 Merrimac St.
- Springfield: William E. Haskell, ADM, 1200 Main St.
- Worcester: Dwight C. Daniels, DM, 340 Main St.

New Hampshire:
- Manchester: Thomas H. Hagan, DM, Amoskeag Industries Bldg.

Rhode Island:
- Providence: John C. Nash, DM, 530 Industrial Training Bldg.

Vermont:
- Montpelier: Lester E. Richwagen, DM, 84 State St.

REGION 2—NEW YORK, N. Y.

John P. Maguire, RD, 122 East 42d St.

New Jersey:
- Newark: (Vacancy), DM, Globe Indemnity Bldg.

New York:
- Albany: F. J. Holman, DM, 112 State St.
- Buffalo: Paul R. Smith, DM, 1138 Rand Bldg.
- New York: Robert F. Morse, DM, 122 East 42d St.
- Rochester: Mahlon H. Gregg, DM, 707 Commerce Bldg.
- Syracuse: Thurlow D. Harter, DM, 224 Harrison St.
- Utica: Earl R. Mason, DM, First National Bank Bldg.

REGION 3—PHILADELPHIA, PA.

Orville H. Bullitt, RD, 1617 Pennsylvania Blvd.

Delaware:
- Wilmington: Thomas E. Doremus, DM, 314 Pennsylvania Bldg.

Maryland:
- Baltimore: G. W. Creighton, DM, Baltimore Trust Bldg.

New Jersey:
- Camden: F. H. Cohen, DM, 300 Broadway.
- Trenton: Charles B. Gilbert, DM, 1102 Broad St. Bank Bldg.

Pennsylvania:
- Allentown: J. R. Sanborn, DM, 506 Hamilton St.
- Chester: Abbott Smith, DM, 12-14 East 5th St.
- Harrisburg: Ritchie Lawrie, Jr., DM, 112 Market St.
- Lancaster: Ritchie Lawrie, Jr., DM, Woolworth Bldg.
- Norristown: F. P. Gross, DM, Norristown-Penn. Trust Bldg.
- Reading: John A. Archer, DM, 615 Penn St.
- Scranton: J. P. Eyre Price, DM, First National Bank Bldg.
- Williamsport: John H. McCormick, DM, 120 West 4th St.
- York: R. S. Cole, DM, Yorktowne Hotel.

Virginia:
- Norfolk: C. F. Rhodes, DM, 526 Dickson Bldg.
- Richmond: Courtney S. Welton, DM, Schmidt Bldg.
- Roanoke: A. D. Miller, DM, 29 Franklin Rd. West.

REGION 4—ATLANTA, GA.

Harry G. Thornton, RD, 116 Candler Bldg.

Alabama:
- Birmingham: James P. Barnes, DM, 322 Phoenix Bldg.

Steel Division of the War Production Board

(Social Security Building, Washington, D. C.)

***Director* H. G. Batcheller**

Assistant Directors

Carl Meyers ..... Raw Materials and Facilities
David F. Austin ..... Production
Norman W. Foy ..... Distribution Control

Branch Chiefs

H. J. French ..... Metallurgical and Conservation
William Kerber ..... Raw Materials
L. E. Creighton ..... Alloy Steels
J. V. Honeycutt ..... Wire and Heavy Products
G. G. Gries ..... Bar, Sheet and Strip
C. H. Longfield ..... Tubular Products and Tinplate
John H. Stapleton ..... Program Distribution Control
P. F. Schucker ..... Export Steel
J. R. Stuart ..... Warehouse

Assistant Branch Chiefs

E. J. Hergenroether ..... Metallurgical and Conservation
S. A. Crabtree ..... Alloy Steel
J. K. Killmer ..... Alloy Steel

Section Chiefs

H. W. Bryant ..... Construction
P. M. Reinartz ..... Planning
F. A. Weidman ..... Maintenance and Repair
H. W. McQuaid ..... Operations
R. L. Wilson ..... Construction Steels
S. C. Spalding ..... Tool Steels and Stainless
D. J. Reese ..... Iron and Steel Manufacturing
E. D. Pratt ..... Information
S. O. Hobart ..... Iron Ore
J. H. Bemis ..... Pig Iron
Alex Miller ..... Scrap
M. M. Sauers ..... Refractories and Fluxes
Samuel Weiss ..... Fuel
G. L. McBreen ..... Construction Alloy Steels
P. E. Floyd ..... Stainless Steels
J. P. Larkin ..... Tool Steels
J. F. Reid ..... Scheduling
M. W. Cole ..... Plates and Shapes
George Bruner ..... Rails
George Hocker ..... Forgings and Castings
H. M. Francis ..... Wire Rods, Wire and Wire Products
W. F. Vosmer ..... Hot Rolled Bars and Semi-Finished Steel
E. B. Files ..... Cold Finished Bars
L. F. Miller ..... Sheet and Strip
D. F. Lacy ..... Pipe
W. H. Wiewel ..... Tubing
R. F. Sentner ..... Tinplate
A. J. O'Leary ..... Requirements
E. L. Resler ..... Statistics and Control
Charles Halcomb ..... Priorities and Allocations
C. W. Eichelberger ..... Tabulating
J. F. Johnson ..... British Export
R. H. Olson ..... Russian
L. S. Simons ..... Latin-American Export
T. G. Smith ..... General Export
E. F. Studwell ..... Merchant Trade Products
A. Y. Sawyer ..... General Steel Products
C. C. Fink ..... Control
Joseph L. Block ..... Production Directive Committee

Special Assistants

James A. Rowan
Oram Fulton
Clark King
T. S. Fitch
C. Sterry Long
Robert Wolcott
Harold Ruttenberg
William B. Todd
Samuel P. Wetherill
Julius A. Clauss
George A. Chamberlain

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Mobile: John A. Miller, ADM, First National Bank Bldg.

Florida:

Jacksonville: T. L. Staton, DM, 530 Lynch Bldg.

Miami: Forrest D. Banning, DM, 701 Congress Bldg.

Tampa: Herbert A. Brennan, DM, 901 Wallace S. Bldg.

Mississippi:

Jackson: A. G. McIntosh, ADM, 605 Tower Bldg.

North Carolina:

Charlotte: James E. MacDougall, DM, Charlotte Law Bldg.

Raleigh: Thomas J. Love, ADM, Sir Walter Hotel Bldg.

South Carolina:

Columbia: Thomas K. Legare, DM, 204 Manson Bldg.

Greenville: Fred Tattersall, ADM, Palmetto Bldg.

Tennessee:

Chattanooga: Paul E. Shacklett, DM, 911 James Bldg.

Knoxville: Walter W. Mynatt, DM, 203 Goode Bldg.

Memphis: John K. Lester, DM, 1821 Sterick Bldg.

Nashville: Stuart Fonde, DM, 1013 Stahlman Bldg.

REGION 5—CLEVELAND, OHIO

John C. Virden, RD, 1300 Union Commerce Bldg.

Elmer C. Henlein, Deputy Director, in charge of Cincinnati area, 34 East 4th St., Cincinnati, Ohio.

A. H. Burchfield, Jr., Deputy Director, in charge of Pittsburgh area, 800 First National Bank Bldg., Pittsburgh, Pa.

Kentucky:

Louisville: H. Dale Rue, DM, Todd Bldg., 4th and Market St.

Ohio:

Akron: Harold B. Harpham, DM, 618 Central Tower.

Canton: E. Oscar Kuendig, DM, First National Bank Bldg.

Columbus: B. C. Zuhars, DM, 513 East Town St.

Dayton: H. B. Doty, DM, 129 South Ludlow St.

Lima: Harry Wright, Jr., DM, Colonial Finance Bldg.

Youngstown: Leif Oyen, DM, Union National Bank Bldg.

Pennsylvania:

Erie: Harry B. Joyce, DM, Erie Trust Co. Bldg.

Johnstown: I. Walter Sell, DM, U. S. National Bank Bldg.

West Virginia:

Charleston: E. J. McClees, DM, 34 Capitol City Bldg.

Clarksburg: Alex H. Cooper, DM, Union National Bank Bldg.

Huntington: Frank B. Enslow, DM, 309-11 West Virginia Bldg.

Wheeling: E. C. Drake, DM, Fidelity Bldg.

REGION 6—CHICAGO, ILL.

A. T. Kearney, RD, 226 W. Jackson Blvd.

Illinois:

Decatur: Paul Fields, DM, 308 Standard Office Bldg.

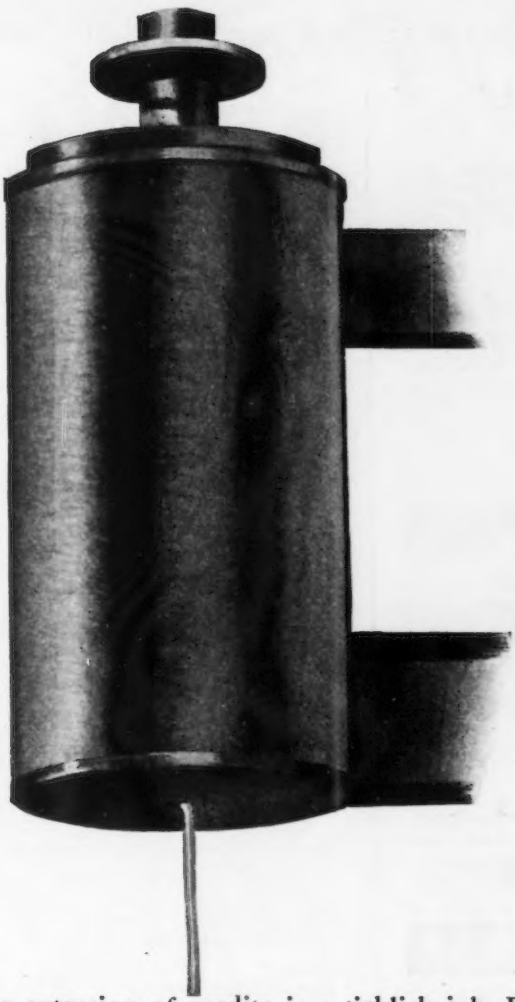
Peoria: Ralph W. Prichard, DM, 1107 Alliance Life Bldg.

Rockford: James Marks, ADM, 621 Gas and Electric Bldg.

Springfield: Walter Lyle Eckhardt, DM, 407 Leland Office Bldg.

Indiana:

Evansville: Ralph C. Hubert, DM, 8 Keonig Bldg.



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—and how Hele-Shaw Fluid Power Engineers tamed it

The extrusion of cordite is a ticklish job. Every conceivable precaution must be exercised to protect life and property.

Our engineers were asked to cooperate. Because of the safety factors there were many complications.

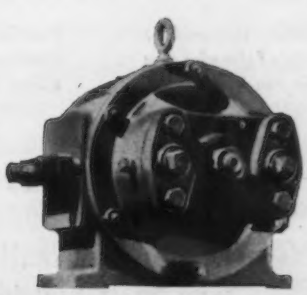
It was desirable, for example, to bring the ram down to the plug quickly to avoid wasting time. However, once the ram neared the cordite plug it had to stop, proceed automatically, and contact the plug without shock. There was still another condition. Once contact had been made, speed of extrusion and pressure had to be automatically controlled, depending on the consistency of the plug.

After conferences with the manufacturer, we designed and furnished the entire pumping unit and oil circuit, including Hele-Shaw Fluid Power pumps and special controls.

Your post-war thinking may lack the drama of a cordite extruder, but offer equally baffling problems in improving a product or process, or in simplifying control or operation of a machine. If you have an idea Hele-Shaw Fluid Power or Hele-Shaw engineers can help you in your post-war planning, you are invited to write for further assistance.

THE **Hele-Shaw** *Fluid Power Pump*

AE CO 75th ANNIVERSARY



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You Can Depend On "Hercules" (Red Strand) Wire Rope

Highlights of Quality

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There is no guess work when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.

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NEWS OF INDUSTRY

Fort Wayne: George A. Dinnen, DM, 410 Utility Bldg.
Gary: W. J. Barndollar, ADM, 926 Gary State Bank Bldg.
Indianapolis: Jack Frohlich, DM, Circle Tower Bldg.
South Bend: Howard Richardson, ADM, 206 City National Bank Bldg.

Iowa:
Davenport: William Ogden, DM, 404 Kahl Bldg.
Des Moines: Walter Muir, DM, 600 Liberty Bldg.

Wisconsin:
Appleton: Paul W. Romig, ADM, 314 College Ave.
Eau Claire: D. W. Walters, DM, 128½ Graham Ave.
Madison: J. D. Howard, DM, 405 Washington Bldg.
Milwaukee: Frank W. Greusel, DM, 7048 Plankinton Bldg.
Wausau: Herbert Crane, DM, 408 3d St.

REGION 7—KANSAS CITY, MO.

W. Capen Shank, RD, Mutual Interstate Bldg., 13th and Locust Sts.
Louis E. Crandall, Deputy Director, in charge of St. Louis area, Paul Brown Bldg., St. Louis, Mo.

Arkansas:
Fort Smith: Frank P. DeLarzelere, DM, Kelley Bldg.
Little Rock: Charles S. Christian, DM, Pyramid Bldg.

Kansas:
Wichita: Harold G. Hartzell, DM, Union National Bank Bldg.

Missouri:
Kansas City: William B. Satterlee, DM, Mutual Interstate Bldg.
Joplin: Lauren R. Reynolds, DM, 701 Joplin National Bank Bldg.

Nebraska:
Omaha: Laurence B. Holland, DM, City National Bank Bldg.

REGION 8—DALLAS, TEX.

R. Eugene Risser, RD, 910 Fidelity Bldg.

Louisiana:
New Orleans: A. T. Dusenbury, DM, Canal Bldg.
Shreveport: Frank C. Mason, ADM, Ardis Bldg.

Oklahoma:
Oklahoma City: Charles F. Aurand, DM, Key Bldg.
Tulsa: Alfred E. Ballin, DM, Petroleum Bldg.

Texas:
El Paso: Robert C. Stryker, DM, Caples Bldg.
Houston: Hugh J. Corcoran, ADM, Electric Bldg.
San Antonio: Carl L. Pool, DM, Majestic Bldg.

REGION 9—DENVER, COLO.

Leslie A. Miller, RD, Kittredge Bldg.

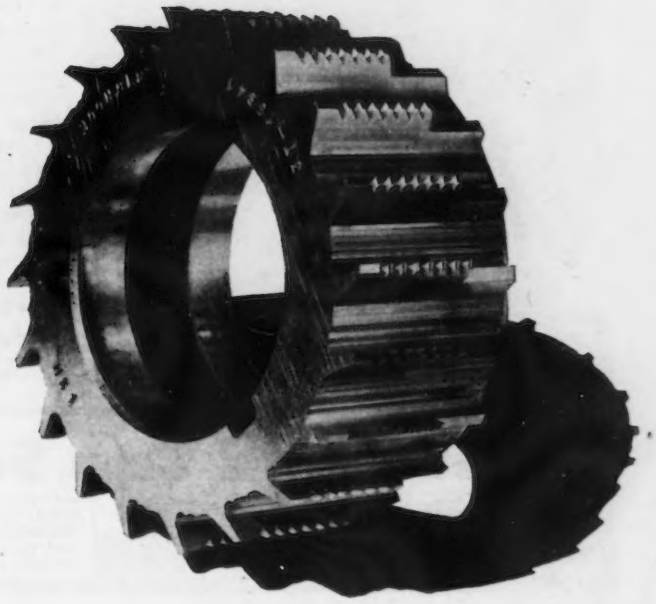
Colorado:
Pueblo: Louis M. Mathis, DM, Post Office Bldg.

Montana:
Helena: Oscar A. Baarson, DM, Power Block Annex.

New Mexico:
Albuquerque: Murray H. Sprague, DM, 103½ West Central Ave.

MAKE *Sharpening* EASIER

No. 4 in a series



Parts produced with this Detroit Tap and Tool combination thread milling and boring cutter were superior to those produced with competitive spiral gashed cutters.

For many years it had been the accepted practice in certain high precision thread milling operations in aircraft engines to use spiral fluted hobs. Today, as the result of a suggestion from Detroit Tap engineers, straight fluted hobs like the one above are used for this operation.

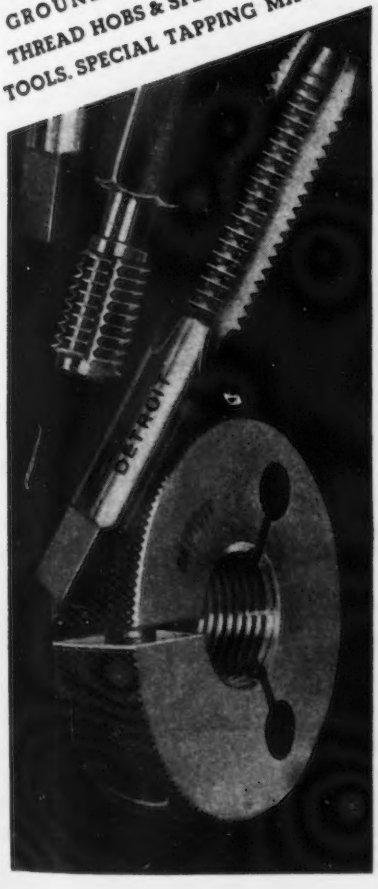
Result No. 1: Even relatively untrained women can sharpen these cutters accurately now, whereas the spiral fluted types were very difficult to sharpen.

Result No. 2: Thread accuracy is even better than with the spiral fluted hobs.

The reasons: The main purpose of spiral-fluting is to reduce impact. In internal milling with more than one set of teeth in contact at one time, spiral fluting is frequently unnecessary. Straight fluted hobs are always easier to sharpen accurately than spiral fluted types.

This is just one of the many examples of how Detroit Tap field engineers have helped to improve accuracy, simplify production, and reduce cost in threading operations. Sometimes a little change will make all the difference. They'll be glad to help you too.

GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS. SPECIAL TAPPING MACHINES



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SPECIALIZATION in the upset process here at "Cleveland" has brought profitable advantages to users searching for high standards in fasteners. You can get all types of bright full finished, 1035 heat treated and alloy cap screws, and properly case hardened set screws from "Cleveland"—all made by the newest refinements in Kaufman Process procedure. Special upset parts to your specifications. Most sizes of standard items carried in stock at our convenient warehouses. Write for samples and prices.

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Made by the Originators of the Kaufman Process for Greater Strength and Accuracy
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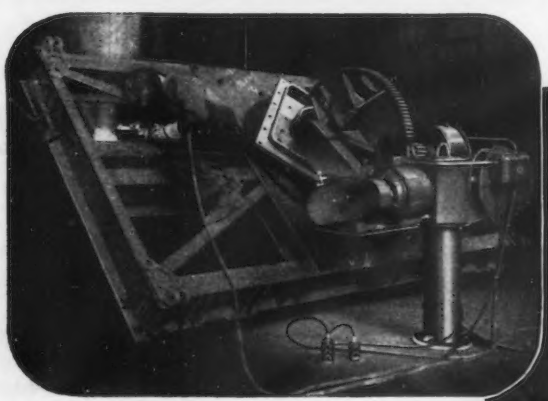

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Now faster, better welding

C-F POSITIONERS are enabling many manufacturers to make their products better and at lower costs by changing over to *welding*. Positioned welding speeds production, improves the quality of welds and reduces handling costs to an absolute minimum.

With a C-F POSITIONER all sides, top and bottom of a weldment can be welded "down hand" with a single set-up. Without the services of a crane or crane crew, the welder himself positions the weldment, rotates it (to 360°) or tilts it (to 135° beyond horizontal) with a push button control. Large variety of models and types in capacities from 1200 to 30,000 lbs. All adjustable for height and pedestal mounted to give maximum clearance.

Write for Bulletin WP 22.

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Utah:

Salt Lake City: Ralph E. Bristol, DM, Atlas Bldg.

Wyoming:

Casper: Frank M. Ashley, ADM, P and R Bldg.

REGION 10—SAN FRANCISCO, CALIF.

Harry H. Fair, RD, 1355 Market St.

Alexander Macdonald, Deputy Director, in charge of Los Angeles area, 1031 S. Broadway, Los Angeles.

Milton H. Luce, Deputy Director, in charge of Seattle area, White-Henry-Stuart Bldg., Seattle, Wash.

Arizona:

Phoenix:
Henry S. Wright, DM, Security Bldg.
Lee G. Browne, DM, Security Bldg.

Tucson: William I. Walsh, DM, 68 East Congress St.

California:

Fresno: John S. Moffatt, ADM, Mattei Bldg.

Oakland: W. P. Collins, ADM, 1924 Broadway.

Sacramento: Orlando McCrane, ADM, Farmers' and Mechanics Bldg.

San Diego: Ralph Proctor, ADM, 1126 San Diego Trust & Savings Bldg.

Idaho:

Boise: Raymond J. Briggs, DM, Capitol Securities Bldg.

Nevada:

Reno: Edwin S. Bender, DM, Saviers Bldg.

Oregon:

Portland: J. Fred Bergesch, DM, Bedell Bldg.

Washington:

Spokane: Dewitt E. Wallace, DM, Sun Life Assurance Bldg.

REGION 11—DETROIT, MICH.

Daniel J. Hutchins, RD, 7310 Woodward Ave.

Michigan:

Grand Rapids: Ray M. Olds, DM, 1004 Michigan National Bank Bldg.

Iron Mountain: George Wallner, DM, 400 Commercial National Bank Bldg.

Saginaw: Raymond G. Donahue, DM, 614 People's Bldg. and Loan Association.

Ohio:

Toledo: A. E. Buchenberg, DM, 833 Security Bank Bldg.

REGION 12—MINNEAPOLIS, MINN.

F. Peavey Heffelfinger, RD, 326 Midland Bank Bldg.

Minnesota:

Duluth: A. J. Newman, DM, 307 Christie Bldg.

North Dakota:

Bismarck: Paul W. Fawcett, ADM, First National Bank Bldg.

South Dakota:

Sioux Falls: James G. Scott, ADM, Fourth floor, Western Surety Bldg.

CANADA

Ottawa, Ont.: Joseph Tucker, Temporary "3" Bldg.

"Pittsburgh" Announces

NEOCETA*

[SYNTHETIC BRISTLE]

—an important scientific discovery which makes possible synthetic bristle brushes as efficient as those made with high grade natural bristles.

—developed by Pittsburgh Plate Glass Company, Brush Division, laboratories after a 3-year research . . . produced exclusively by "Pittsburgh" . . . ready now!

—makes possible America's first full line of practical synthetic bristle brushes.

Two years before Pearl Harbor, Pittsburgh Plate Glass Company scientists were experimenting with synthetic bristle—trying hundreds of formulas—testing results. Their aim was to make this country independent of the Far East as a source of supply—to provide against the shortage of natural bristles that would inevitably occur in case of war with Japan.

As the nation's leading manufacturer of quality brushes, we considered it our responsibility to continue to supply high-grade brushes regardless of where the war might spread.

Our three years of research work have now been crowned with complete success. A new substance called NEOCETA has been developed. Extensive tests prove that "Pittsburgh's" Neoceta bristle brush performance is comparable with any pre-war brush.

Practical! Workable! Durable!

Neoceta bristle is tapered, giving it the necessary elasticity and "feel" of natural bristle. Spreading ability is entirely satisfactory. Neoceta brushes hold as much—*or more*—paint as pure bristle brushes—and rival them in durability and the character of the film they produce.

Here, in short, is a product that is very far from being a temporary wartime substitute. It is a great step forward in paint application practices.

Availability

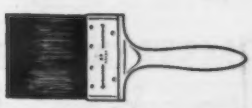
Winning the war comes first! Brushes of Neoceta are now available to the Army, Navy, or contractors for war materials for the Armed Services. *Bristle brushes, made and distributed in accordance with W. P. B. regulations, are also still available, with the necessary priority, through "Pittsburgh" branches everywhere.*

**Trade Mark Reg. U. S. Patent Office No. 397,100*

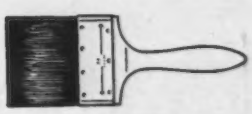
PITTSBURGH
PLATE GLASS COMPANY

NEOCETA brushes are manufactured by the creators of famous *Gold Stripe* brushes

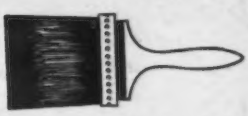
NEOCETA
Brushes Available Now



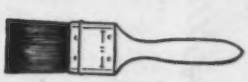
Metal Bound Flat Paint—Professional type. 4" width, 4" length clear.



Metal Bound Flat Paint—Utility type. 4" width, 3¼" length clear.

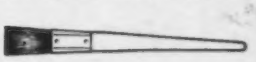


Leather Bound Flat Paint—Professional type. 4" width, 4⅜" length clear.

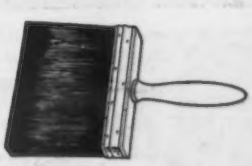


Flat Varnish—Utility type. 1", 2" and 3" widths, 2", 2½" and 2¾" lengths clear.

Touch-Up Flat Varnish—General work. ½" width, 1⅝" length clear.



Oval Sash—Sizes 4, 8 and 12. 1¾", 2¼" and 2¾" lengths clear.

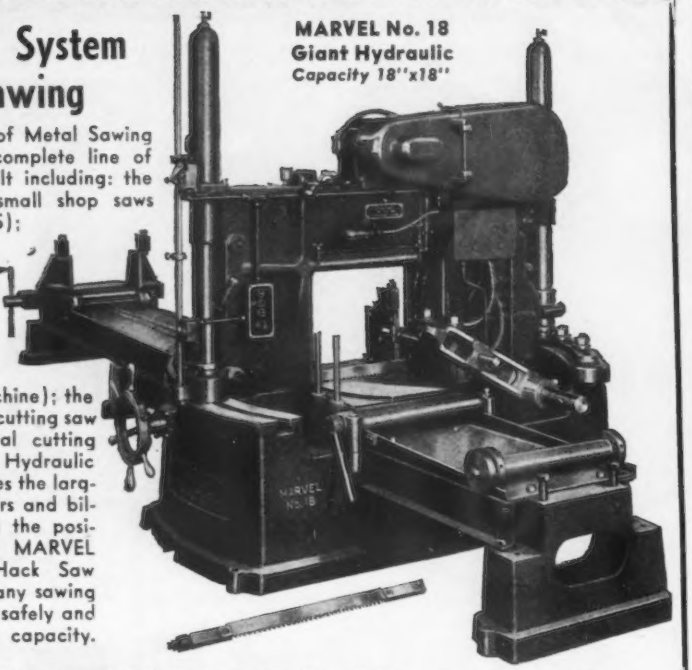


Wall Coating or Calcimine—For use in resin emulsion paint as well as calcimine or oil paint. Size 5"x1½". 3¾" length clear.

MARVEL SAWS

A Complete System of Metal Sawing

The Marvel System of Metal Sawing provides the most complete line of sawing machines built including: the most widely used small shop saws (80% are MARVELS); the fastest high speed hack saws built (automatics that will cut-off identical bars with no more operator attention than an automatic screw machine); the most versatile metal cutting saw—(a universal metal cutting band saw). Giant Hydraulic hack saw that handles the largest and toughest bars and billets with ease; and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades that permit any sawing machine to operate safely and continuously at full capacity.



MARVEL No. 18
Giant Hydraulic
Capacity 18"x18"

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago, U. S. A.

Eastern Sales Office
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We can't say where they're going—but they're on their way!

B-G-R springs disappear daily into the great war plants of this nation to do the kind of a job for which they are intended. It may be on the firing line—or it may be in the machines that make fighting weapons. It's all the same, every job today is a war job.

You can't identify a B-G-R spring by just looking. But when it comes to cold analysis of comparative tests in actual use, you'll understand why B-G-R springs are specified year after year. Try them and see for yourself.

BGR Springs · Wire Forms · Small Stampings
ARMY
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BOTH PLANTS
BARNES-GIBSON-RAYMOND
DIVISION OF ASSOCIATED SPRING CORPORATION
TWO PLANTS FOR SPRING SERVICE
DETROIT and ANN ARBOR MICHIGAN
B-G-R PRODUCTS SERVE OUR COUNTRY-ON-LAND, AT SEA, AND IN THE AIR

Alcoa Granted Work Incentive Plan by NWLB

• • • The NWLB unanimously approved on May 6 an incentive wage plan submitted to it by the Aluminum Co. of America to apply to the company's Lafayette, Ind., plant. The Board's approval of the plan is subject to the provision that the plan shall not increase the unit labor cost and subject also to periodic review by the Wage Stabilization Division of the Board.

The incentive plan will result in overall increases of about 20 per cent for about 2800 of the plant's personnel of 5000, and will, according to the company's engineers who prepared the plan, also result in a production increase of 20 per cent.

Freight Change Seen Affecting Trucking

Cleveland

• • • The effect of the suspension of the 6 per cent increase in rail rates, effective May 15, probably will mark an about-face in the recent upward trend of rates of the common motor carrier industry. Increases have been made in common motor carrier rates during the past several months, which, generally speaking, have resulted in placing the present less-than-truckload common motor carrier rates for iron and steel on a higher level than the corresponding l.c.l. iron and steel rail rates. The truckload common motor carrier rates for iron and steel products from many of the Ohio producing points to the heavy consuming areas in Ohio and surrounding states are at present just about on the same level as the carload rates in rail shipments.

The 6 per cent lop-off in rail rates and charges almost without exception will cause a disparity between truckload and carload rates and increase the difference now existing between less-then-truckload and l.c.l.

Steel producers expect a general swing-over from shipping by truck to shipping by rail. Customers with orders on the books that call for truck routing will, when such truck charges exceed the corresponding rail charges, probably ask that the shipment be re-routed to take advantage of the lower rail rates.

P&H
One post-war problem we've already answered
We're set for whatever comes — now or after the war—with efficient materials handling facilities throughout our plant. Today, *speed* counts most in meeting our wartime schedules. Tomorrow, *lower costs* will stand us in good stead in a competitive market.
The dependability and long life of P&H Electric Cranes answer *this* problem for us.
P&H is America's largest and only crane builder producing complete electrical crane equipment.
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P&H
OVERHEAD CRANES

CMP Details Seen Unsettled; Components and Paperwork Problems

• • • **Changes in the Controlled** Materials Plan have been frequent for the past several weeks which reflects a settling of the major details but an unsettling of the minor details just before the date of the Plan's full control set for July 1. New regulations, interpretations and directives which poured out of Washington in the early stages are still pouring although at possibly the lowest attainable stage as individual problems will always require certain individual direction. Furthermore, the long awaited Regulation No. 6, concerning construction and which is said to be patterned closely after Regulation No. 1, is yet to come and though its issuance has been rumored several times no set date has yet been announced.

Paperwork is being cut in some instances by the elimination of forms and consolidation of information such as the new CMP-24 form for aluminum products which eliminates 12 old forms previously required. In practically the same breath, WPB announces that steel producers must file a daily report of accepted controlled material orders for carbon and alloy steel and wrought iron beginning May 15. Steel castings orders will not be reported and railroad track accessories reported monthly.

Washington authorities say that despite recent criticism, split ratings will be continued although intelligence in making the split is being stressed. Component manufacturers have been issued specific instructions to apply split ratings with care and to hold them strictly to early delivery schedules.

Nothing of importance has been heard of the new Component Scheduling Plan mentioned as coming in last week's issue of THE IRON AGE although component scheduling seems to be taking a leading place in WPB attention. Makers of construction machinery have been promised that internal combustion engines will be scheduled to improve deliveries. Only recent announcements concerning the now much discussed destroyer-escort vessels emphasized the importance of components in their speedy construction leading to the belief that component scheduling is also their biggest bottleneck. Some success in the scheduling of components to date is seen in the case of manufacturers of flow meters who report that they are now able to fill all orders on schedule.

Orders for materials for the manufacture of Class B products for the third quarter are required to carry allotment numbers with the new symbol identifications published in THE IRON AGE on page 112, April 22 issue.

Steel producers wishing to receive steel from another producer have been instructed by H. G. Batcheller to endorse their purchase order with the serial number of the allocation order and the symbol FC. The recipient must report the transaction under the symbol FC on CMP-8. A similar method has also been setup for interwarehouse exchanges of brass mill products.

Forms CMP-4C, CMP-14 and 15 are reported revoked.

Kinnear Wood Rolling Doors

Offering the space-saving, *coiling upward action* and other operating advantages of the famous Kinnear **Steel** Rolling Doors, these rugged WOOD doors have piled up years of satisfactory service on various types of installations.

Now — in wartime — when every possible pound of steel must be saved — these time-tested WOOD doors are the perfect answer to every service door need, in buildings of every type!

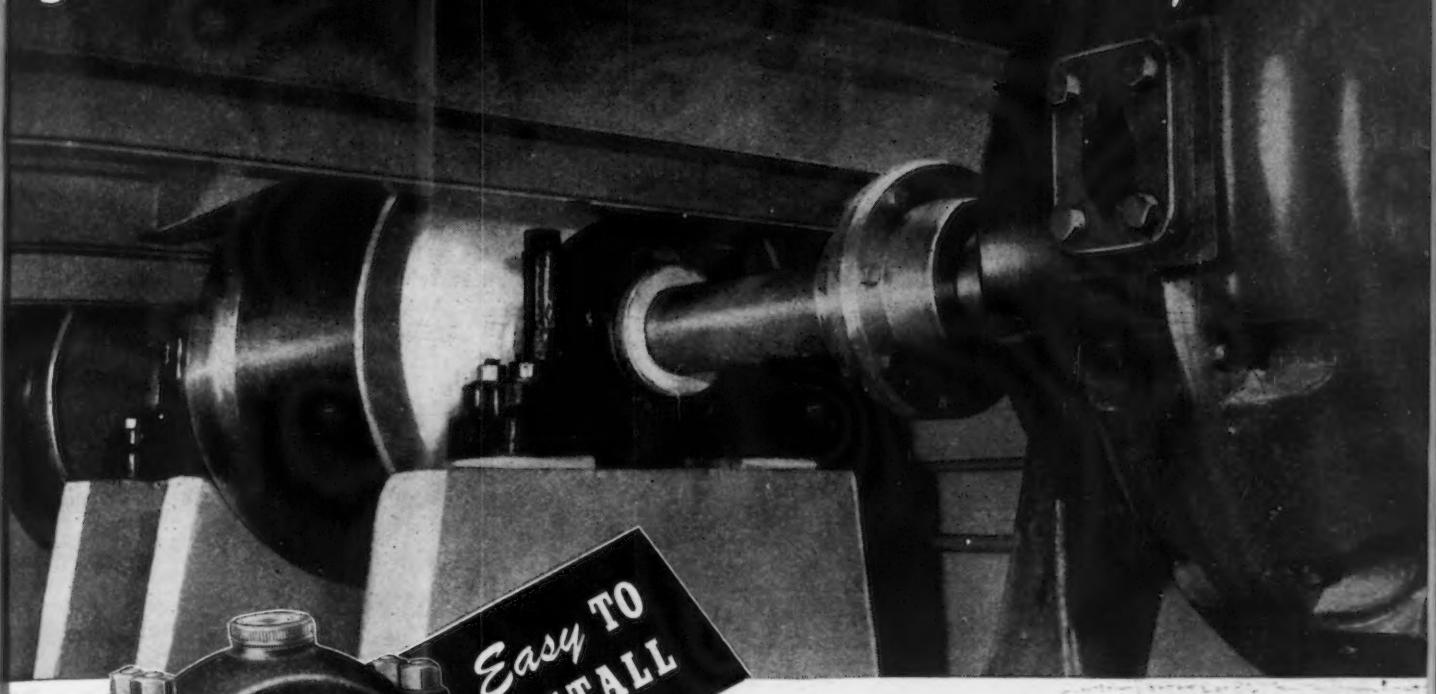
Look at the advantages Kinnear WOOD Rolling Doors offer: Smooth, quick, easy operation . . . a rugged interlapping slat curtain that coils out of the way and out of reach of damage . . . maximum savings in floor, wall and ceiling space . . . full protection against wind and weather . . . choice of motor or manual control . . . neat, modern appearance . . . and maximum savings in war-vital steel. Kinnear Wood Rolling Doors are available now, in any size, for new construction or replacements. Write for details. The Kinnear Manufacturing Company, 1760-80 Fields Avenue, Columbus, Ohio.

KINNEAR ROLLING DOORS

A SAVING WAY FOR DOORWAYS

RUGGED DODGE-TIMKEN BEARINGS

get more *Battle Power* out of *Horsepower*



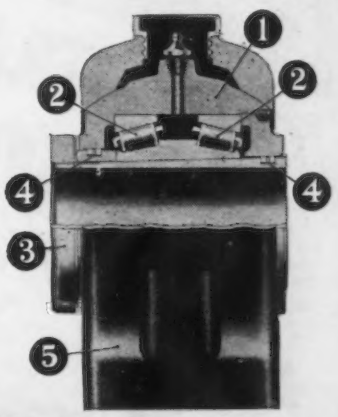
Super-rugged . . . Dodge-Timken bearings have what it takes to withstand the "beatings" bearings get in today's 168-hour weeks of war production. Completely assembled . . . ready for instant installation . . . capable of 30,000 hours of service . . . pre-lubricated for 50-million revolutions under normal conditions without relubrication . . . sealed against admission of dirt or leakage of lubricant. They eliminate maintenance delays . . . conserve vital man-hours and critical materials . . . speed peak production.

Advantages of DODGE-TIMKEN SPECIAL DUTY BEARINGS

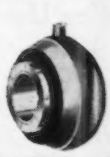
1—Full ball and socket self-alignment . . . guards against power waste and wear. 2—Timken tapered roller bearings give full radial and thrust load capacity . . . put full power in production. 3—Easy to install—simply slip over shaft and tighten collar. 4—Piston ring seals retain lubricant and exclude dirt. 5—Rugged outer housing gives over-all protection to bearing.

Contact Local Dodge Distributor or write to

DODGE MANUFACTURING CORPORATION, Mishawaka, Ind., U.S.A.



Dodge-Timken Special Duty Ball-and-Socket Pillow Block



Dodge-Timken Special Duty "D" Unit Mount

Dodge-Timken Special Duty "S-1" Unit Mount

Dodge-Timken Special Duty "B-1" Unit Mount

DODGE

MISHAWAKA

THROW ALL YOUR SCRAP INTO THE FIGHT! . . . BUY MORE WAR BONDS!

THE RIGHT DRIVE FOR EVERY JOB

Dodge-Timken Pillow Blocks and Dodge Diamond "D" Clutch . . . dependable operation . . . low maintenance.

PUT *ALL* YOUR POWER IN THE JOB

Buyers and Dealers Warned on E-5-a

Washington

• • • **It has been called** to the attention of the WPB Tools Division that war contractors have been issuing "blanket" purchase orders to distributors of gages and precision hand tools, applying to such orders the contractor's MRO supplies preference rating for tools to be held in the distributor's stock for sale exclusively to the particular contractor's employees.

Such practice is a direct violation of Priorities Regulation No. 3 as well as General Preference Order E-5-a. No person may apply a rating to secure material being purchased not by the person applying the rating but on the contrary being bought and paid for by a third person. The only mechanism under which the contractor's rating may be used is that established by E-5-a.

Any distributors who have stocks of precision tools so earmarked for a specific contractor's employees must make these tools available to any approved user or employee in accordance with the terms of General Preference Order E-5-a. Continued violations will be submitted to the Compliance Division of the War Production Board. All purchase orders placed with any producer of gages and precision hand tools which were rated by a customer with such an understanding that they are to remain earmarked stock for such customer's employees should be cancelled immediately.

FLATNESS
AND
SMOOTHNESS
of Production Parts
YOUR production parts finished by the new Ultra-Lap machine method, to an optically flat surface . . . to specifications for flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S. thereof . . . much faster, more uniform than . . . any metal or material, or any combination hand methods.
Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.
Ultra-Lap MACHINE COMPANY
255 McDOUGALL AVE. DETROIT, MICH.

Heesch Named to Farm Machinery Branch

Washington

• • • **William F. Heesch** has been appointed Deputy Director of the WPB Farm Machinery and Equipment Division. He was recently Civilian Chief of Small Arms Production Planning and Control, Ordnance Department, United States Army. Mr. Heesch has been associated with the farm machinery industry throughout his business career.

Materials for Foundry Equipment Now Under CMP

• • • **Supplementary Order P-31-a,** applying to foundry equipment, was revoked last Friday by WPB. Material for the production of foundry equipment is now obtained under applicable regulations of CMP.

Steel Conversion for War Use Aided by Ceilings

• • • **Conversion to war** uses of steel mill products that cannot be used for their peacetime purposes is facilitated by OPA in an amendment to the price schedule for iron and steel.

Action is taken in Amendment 8 to Revised Price Schedule 6 effective May 13, 1943.

Chiefly affected are charges for such processing as re-rolling, cold-rolling, and pickling done by steel mills according to owners' directions on iron and steel products which cannot be used for their original manufacturing purposes.

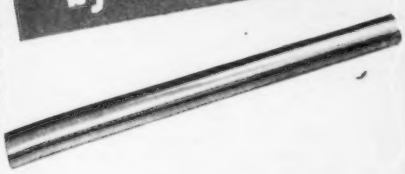
No maximum charge is applicable when the material is to be resold by the owner at prices established by Revised Price Schedule 6 or Revised Price Schedule 49.

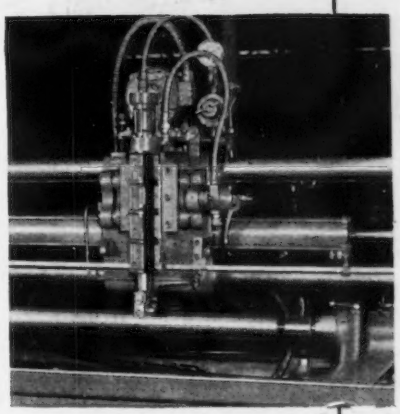
There is no maximum charge specified when the aggregate charge for conversion or processing does not exceed $500.

Conversion or processing operations such as annealing, machine straightening,

HOW TO IMPROVE MACHINE PERFORMANCE BY ELIMINATING SURFACE DEFECTS!

Here's How One Manufacturer Improved Machine Performance by Superfinishing Steel Ways...





This manufacturer of a small boring machine superfinishes the steel ways to 3 micro-inches. To obtain the required sensitive, smooth movement over the ways, a Foster Superfinishing Machine was used to remove surface defects, such as diamond marks and chatter marks caused by previous machining operations. Machine performance was improved by superfinishing the ways to an extremely fine surface, which reduces wear and maintains absolute accuracy.

JOB DATA

Machine—Foster General Purpose Superfinisher, 4″ x 36″.

Part—Steel ways for small boring machine.

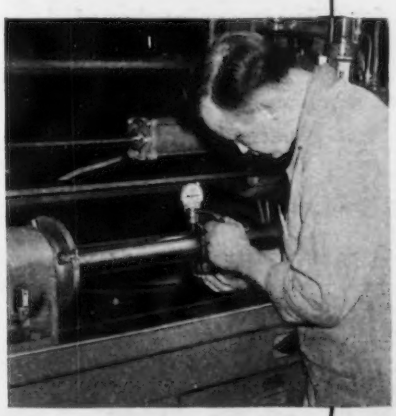
Part Size—2⅜″ dia. with lengths from 24″ to 38″.

Material—Steel, hardened to 62-64 Rockwell.

Previous Finishing Operations—Grind to 10-15 micro-inches.

Superfinishing Operations—Finish to 3 micro-inches.

Production—40 to 45 minutes to superfinish a 30″ long "Way."



Superfinishing, the new process for producing fine surface finishes and removing surface irregularities, improves your product these four ways: (1) Eliminates run-in period (2) Eliminates friction heat (3) Eliminates bearing wear (4) Eliminates vibration and chatter. Foster Superfinishing Machines will solve these four common machine troubles by removing the surface defects usually found in any machined surface. They are capable of producing geometrically improved surfaces of 2 to 3 micro-inches with only .0001″ to .0002″ stock removal.

SUPERFINISHING ELIMINATES THESE SURFACE DEFECTS

1. The familiar ridges produced by the point of a turning tool.
2. Grinder feed spirals, chatter marks, grinder flats, and other defects caused by grinding inaccuracies.
3. The defective condition caused by the violence with which the tool or grinding wheel removes metal, leaving the surface covered with partially loosened splinters of metal.
4. The metallurgical changes in the surface layer of metal caused by heat from grinding.

GET THIS FREE DATA

Send for free booklet with superfinishing data, and complete details on extensive line of Foster General Purpose and Special Machines for miscellaneous or production superfinishing. Write to International Machine Tool Corporation, Foster Division, 1108 W. Beardsley Ave., Elkhart, Ind.

INTERNATIONAL MACHINE TOOL CORPORATION

FOSTER DIVISION, ELKHART, INDIANA · LIBBY DIVISION, INDIANAPOLIS, INDIANA

MAIN OFFICE AT ELKHART, INDIANA

FOSTER FASTERMATICS · LIBBY HEAVY DUTY TURRET LATHES · STANDARD TOOLS
SUPERFINISHING MACHINES · BARKER CHUCKS · UNIVERSAL RAM TYPE TURRET LATHES

and pickling on which there are standard published extras shall be charged for according to the published extras, but an additional charge not to exceed $5 per net ton is allowed for handling.

For operations not covered by the provisions reported above, the converter must file his charges with the OPA.

Charges set forth in the amendment are exclusive of transportation costs incidental to the conversion or processing operation.

•

Chromium Deliveries Eased For Metallurgical Purposes

• • • **Small deliveries** of chromium may be made without WPB authorization under an action taken May 7 by WPB to simplify administration of Chromium Order M-18-a.

Supplementary Order M-18-a-1, effective immediately, permits deliveries of chromium by processors and dealers in quantities of 3,000 lb. or less to a single customer in any one month, provided the material is to be used for metallurgical purposes. The new order also relieves purchasers of quantities within this limit of the necessity of filing report forms usually required by Order M-18-a. It does not, however, relieve chromium consumers from filing Form WPB-532 with the Bureau of Mines. Attention was called to the fact that Supplementary Order M-18-a-1 makes no changes in the restrictions on the melting of chromium.

•

Bessemer OK'd for Rails

• • • **Use of bessemer steel** in the production of rails and track accessories is permitted by Schedule 7 to Order L-211 as amended by WPB. Rails used for electrical contacts are not included.

•

Pipe Fittings Styles Cut

• • • **The number of types** of steel pipe fittings is reduced from 38,784 to 3,615 by L-278 issued May 8 by WPB, to be administered by the Ship-

STRONG • MOLD

THE STRONG WAY PAYS IN MANY WAYS

You can put it all up to Strong, if you have a steel casting from 30 ounces to 30,000 pounds—or a size range of almost any conceivable shape or proportion. The sweep method shown above—typical of Strong's versatility—saves the customer the costly pattern making otherwise needed for this unusually shaped, 33,000 pound casting.

Strong molding facilities range from small snap flasks to steel flasks 16 feet square. This size range is governed only by the size of Strong's largest drying oven (24 x 20 feet). Be sure you know the modern art of steel casting, as Strong has developed it!

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

STRONG

TENSILE STRENGTH • ELONGATION

Priority Changes

M-18-a—Supplementary order permits deliveries of chromium by processors and dealers in quantities of 3000 lb. or less to a single customer in any one month, provided the material is to be used for metallurgical purposes. (5-7-43)

•

P-31-a—Revoked. (5-7-43)

•

P-56—Amended order provides assistance by which mines can quickly obtain needed materials in case of actual or impending breakdown. (5-4-43)

•

L-30-b and c—Amended orders permit manufacturing of enameled and cast iron kitchen utensils for export to be exempted from simplification provisions when specifically authorized by WPB. (5-4-43)

•

L-42, Schedule V—Amended order limits such critical materials as copper, copper base alloy and zinc used in the manufacture of plumbing fixture fittings and trim. Effective July 5. (5-6-43)

•

L-111—Amended order modifies provisions regulating the use of iron, steel and other critical metals in the manufacture of hand trucks and related material-handling equipment. (5-8-43)

•

L-114—Amended order eases restrictions on the use of certain materials in the manufacture of safety equipment. (5-5-43)

•

L-193—Purchase orders for conveying machinery and mechanical power transmission equipment are restricted to those rated AA-5 or higher under the terms of the order as amended. (5-10-43)

•

L-211, Schedule VII—Amended order permits use of bessemer steel in the production of rails and track accessories. (5-6-43)

•

L-237—Amended order modifies provisions for controlling production and distribution of certain light power-driven tools. (5-4-43)

•

L-278—Order reduces the number of types of steel pipe fittings from 38,784 to 3615. (5-8-43)

WIRE ROPE NETWORK

CARRIES BAD NEWS FOR AXIS!

U. S. Maritime Commission photographs.

Shipyards and ships have been and are being built faster than ever before because construction men and shipbuilders were quick to throw overboard time worn precedents, inhibitions and usages. For example, instead of assembling the myriad pieces of each ship on the ways, huge sections of ships are factory fabricated —then swung on WIRE ROPES to the ways and welded into position in a fraction of the time old methods required.

Already, hundreds of Liberty Ships are veterans of the convoys. On a network of WIRE ROPES swing huge loads of fighting equipment to fill their holds and stack their decks in a race against loading time limits once thought impossible.

Yet, these are only a few of the countless ways in which the wire rope network carries bad news to the axis. Its wave length is limitless. It reaches deep into the bowels of the earth to bring up ores, oil and coal. It reaches a mile and a half high into the air to anchor barrage balloons for snaring enemy bombers.

The best of everything goes to war first. So it is that Union Wire Rope is a veteran of the war. The star above our Navy E signifies another six months of star performance in war production. To the very limit permitted under conditions of war our skilled craftsmen and precision machines also convert the finest of steel into tough tendons for all types of man-hour saving machines essential in the prosecution of the war on the home front.

★ *Another 6 Months of Star Performance*

WAR PRODUCTION EXCELLENCE WILL BRING POST WAR PLUS VALUE

union *Wire Rope*

"THE ULTIMATE LOW COST WIRE ROPE"

UNION WIRE ROPE CORPORATION
2158 Manchester Ave., KANSAS CITY, MO.

Tulsa • Houston • Chicago • Salt Lake City • New Orleans
Monahans, Texas • Portland • Ashland, Ky. • Atlanta

AD-43

USERS OF HIGH CARBON STEEL WIRE NOTE!
Subject to war conditions only, our facilities are such as to afford you a dependable source of supply for high carbon steel wire. Our engineers are prepared to submit interesting proposals on your specifications and requirements.

WHEN YOU NEED PREFORMED WIRE ROPE
SPECIFY **union-formed**

building Division. Iron and brass pipe fittings were previously simplified by L-288, so that the new order rounds out the overall program simplifying pipe fittings production.

Pipe fittings to be produced under the order are used in almost every segment of basic industry. The order does not cover the following types: (1) those for use on airplanes and ships, other than pleasure craft, (2) conductors of corrosive liquids or gases, (3) those specially designed for combat use, (4) those used to replace special type fittings, and (5) those enumerated in a list of special types.

Changes in specifications of materials and of pressure classes correspond closely with those of Order L-252 covering valves and valve parts. The chief reductions are in the number of sizes permitted for "reducing fittings," used to join pipes of different diameters.

•

MRO Easily Obtained By Mines on Revised P-56

Washington

• • • To provide assistance by which mines can quickly obtain needed materials in case of actual or impending breakdown, WPB last week issued Order P-56 as amended. In such cases, applications for priority assistance may be made on Form PD-333 or by telegraph, either to WPB in Washington or to the nearest regional or district office. Order P-56 establishes the procedure by which mines obtain maintenance, repair and operating supplies, mining machinery and other materials and equipments.

•

W. Va. Beehive Coke Gets Rise to $7 a Ton

• • • **The maximum** price for beehive oven furnace coke made in Barbour County, W. Va., in hand-drawn ovens to which the coal has been trucked from the mines was established at $7.00 per ton, May 13, by OPA.

Barbour County properly belongs in the Connellsville District and is entitled to the same differential, it has been shown, on cokes made in this way. Previously the ceiling was $6.50 per ton.

The adjustment has been provided by taking beehive oven furnace coke made in Barbour County from MPR No. 121 in Amendment No. 14, and putting it in RPS 77 in Amendment No. 8. Both amendments are effective May 18, 1943.

CMP Developments

• Inter-warehouse exchange of brass mill products from inventories is permitted under CMP, but only according to strict permit. (CMPL-227)

•

• A purchase order placed by a steel producer requesting delivery of steel from another steel producer, who has received a Steel Allocation Order Series B (Form PD-201 or CMPL-182) to make such shipment, must be endorsed with the serial number of the allocation order and the symbol FC. (CMPL-225)

•

• The new Official Program Identification Symbols for Class B Products will be used by WPB Industry Divisions to identify the allotment of materials on Form CMPL-150 made pursuant to application on CMP-4B for the third quarter of 1943 and quarter thereafter.

•

• Special application forms are provided for those who wish allotments of aluminum metal for alloying, deoxidizing, thermit reaction and chemical uses. (CMPL-220)

•

• Interpretation No. 4, of CMP Regulation No. 5, clarifies the provisions of this regulation in regard to materials to make crates for shipment of controlled materials.

•

• Form CMP-24, a new form, is the basic report form to be used for recording the shipments of aluminum products. (CMPL-223)

FABRICATING MACHINERY

PRESSES • DIES • METAL-FORMING MACHINERY

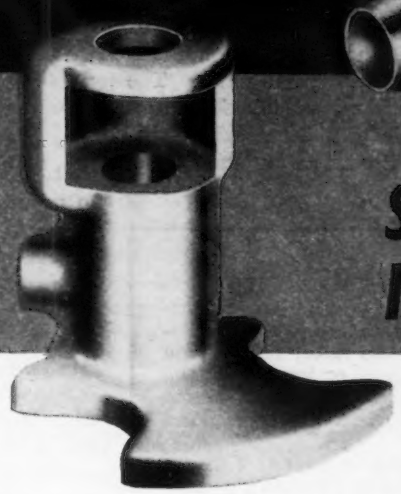
BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

THOMAS MILL TYPE SHEARS

Thomas Mill-Type Shears are built to meet the demands of today's vital production program. You will find them installed in the country's major rolling mills, designed to give top-speed output with minimum delays. Write for our new Bulletin 126, describing and illustrating these various units.

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, PA.

WE HAVE EXTRA FOUNDRY CAPACITY FOR BRASS OR BRONZE CASTINGS



WE CAN SUPPLY THEM IN A HURRY!

● At the present time we have ample capacity and equipment for the manufacture of brass or other copper base alloy sand castings.

In addition to the most modern equipment we have experienced men who have been in our foundry for years. These men have the "know how" for the production of close tolerance work. The castings produced are of uniformly high quality with close grain structure.

We have our own Tool Room and Pattern Shop for any necessary tools or patterns to turn out the job. We can supply them rough, machined, polished or plated.

We manufacture the standard line of STREAMLINE pipe fittings for heating, air conditioning, water works, plumbing or refrigeration use, *or to your specifications.*

If you need castings in a hurry, write us *now.*

MUELLER
BRASS CO.
PORT HURON, MICH.

Wilson Sets Up Functions For Office of Davis, Covering Operations

Washington

• • • **WPB Executive Vice Chairman** Charles E. Wilson on Monday issued an administrative order formally outlining the functions and organization of the office of Donald D. Davis, vice chairman for operations. This office is responsible, together with the three Controlled Materials Divisions, for the execution of established WPB policies, plans and general methods. Under the order, a new production division will handle the utilization of facilities and scheduling of the production of critical components, while the position of scheduling officer was abolished and its responsibilities transferred to the new division.

The administrative order makes Mr. Davis a member of the WPB Requirements Committee in order to act as claimant for maintenance, repair and operating supply requirements of the industry divisions, as well as for "B" products other than consumer goods and services.

The order makes it clear that a major share of the responsibility for the execution of policies, plans and programs of the WPB rests on the several industry and functional divisions and on the regional offices. The regional offices are responsible directly to Wade T. Childress, deputy vice chairman for field operations.

Most of the industry divisions report to John J. Hall, deputy vice chairman for industry operations, through five bureau directors: H. D. Hughes, commodities bureau; James Auten, construction and utilities bureau; Lewis S. Greenleaf, consumers goods bureau; Harry A. Rapelye, equipment bureau; and Howard I. Young, minerals bureau.

Functions of the three special officers who assist the vice chairman for operations and his deputies in the establishment of effective operating programs are specifically outlined in the administrative order. The materials officer is responsible for assuring the effective operation of CMP within the divisions, bureaus and other organizational units. The orders officer is responsible for maintaining within the Office of Operations Vice Chairman a consistent order structure and for the proper clearance of orders and regulations. The program implementation officer is responsible for seeing that all program determinations, except scheduling determinations, are carried out by the various organization units.

Also established by the administrative order are three service offices, as follows:

The Office of Industry Advisory Committees—this office will serve as a focal point for all material relating to industry advisory committees.

The Office of Product Assignment—this office will assign to the industry divisions and other units the products, materials, etc., over which they will have jurisdiction.

The Office of Procedures—this office will serve to assure that efficient operation procedures are established for the carrying out of policies, plans and programs under the jurisdiction of the operations vice-chairman.

Personnel of the immediate office of the operations vice-chairman is as follows:

Operations vice-chairman, Donald D. Davis; deputy vice-chairman for industry operations, John J. Hall; assistant deputy vice-chairman for industry operations, John P. Gregg; deputy vice-chairman for field operations, Wade T. Childress; assistant deputy vice-chairman for field operations, James A. Folger.

Plate Output at Peak; Alloys Still Critical

• • • Steel plate production in April reached an all-time high for a 30-day month as a result of increased rollings during the latter half of the month. Shipments for the month totaled 1,121,647 tons, or just under the peak of 1,167,679 tons recorded in March, a 31-day period. Shipments by continuous strip mills amounted to 535,548 tons in April, compared with 563,302 tons in March.

Other matters discussed with the advisory group included:

ALLOYING METALS—H. J. French, chief of the division's metallurgical and conservation branch, reported that the most critical supply problem among the alloying metals now exists in molybdenum. Mr. French pointed out that the steel division was taking steps to reduce the use of molybdenum in tool steel, and was studying other methods of conservation. He said it would be necessary, however, to utilize more of the "triple alloy steels"—nickel-chromium—molybdenum combinations—and to use available alloy scrap more effectively.

JOINT METALLURGICAL COMMITTEE—Highlights of a report prepared by a joint metallurgical committee on the alloy steel positions of the United States, United Kingdom, and Canada were outlined by Quincy Bent, chairman of the American group and vice-president of Bethlehem Steel Co. The report urged general adoption of the triple alloy steels as a conservation measure. It pointed out that in the use of alloy steels comparable to the American NE series (National Emergency Steels), both Britain and Canada are ahead of this country. Use of such steels amounts to approximately 24 per cent of total alloy steel use in the United States, 33 per cent in Britain, and 50 per cent in Canada.

Among the committee's recommendations were: increased care in segregation of scrap; maintenance of adequate stocks of manganese; a standardization of steels among the three countries; standardization of nomenclature; and standardized markings for scrap.

METALLIC BALANCE—Because of the late opening of the season on the Great Lakes, and the possible effect on the total ore movement for the season, the importance of a continued heavy flow of scrap to mills was stressed by steel division representatives.

Tungsten Steels Granted 35% Ratio of All Tool Steels

Washington

• • • **WPB** on Tuesday announced that Order M-21-h had been amended to permit production and purchase of tungsten type high speed steels up to 35 per cent of the production of all high speed steels. Previously the tungsten type steels were limited to 25 per cent of the total high speed steel supply. The effect of the change is to permit the use of more tungsten with the result that substantial savings will be made in molybdenum.

The acquisition of molybdenum-types of steel for the purpose of obtaining complimentary quantities of tungsten types is not permitted by the order if the molybdenum-types of high speed steel are not put to productive use within the time allowed by WPB inventory regulations.

Harper Resigns WMC Takes Berth With BEW

Washington

• • • **Fowler V. Harper,** deputy chairman of the War Manpower Commission, has tendered his resignation, Chairman Paul V. McNutt announced May 8. Mr. Harper is accepting an administrative post in the Office of Imports in the Board of Economic Warfare.

"MORE PRODUCTION, BETTER FINISH, REJECTS ELIMINATED—Grinding Airplane Cylinder Valve Seats"

writes
POR-OS-WAY'S
WAR PLANT REPORTER

Dear Charlie:

I'm writing this from the [redacted] plant, and here's more bad news for the Axis.

The use of Por-os-way is producing one additional air-plane barrel, with valve seats precision-ground, every working hour. Multiply that one out, and you can see that Por-os-way's got something — something that the Axis doesn't like.

So long 'til next report
Your roving reporter
"Vic"

THE JOB:
Removing .010" to .012" from valve seats of airplane cylinder barrels on a Waddell Valve Seat Grinder—wet grinding at 5,000 R.P.M.

THE WHEEL:
Por-os-way 3¼" x ⅞" x 1⅛" C80 HV3.

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent.

WRITE *for complete booklet "Facts About Por-os-way". The address is 434 Wheatland St., Phoenixville, Pennsylvania*

THE RECORD	POR-OS-WAY	FORMER WHEEL
Pcs. per Hour (2 Seats per Cylinder Barrel)	5*	4
Dressings	None	3 per wheel
Pcs. Per Wheel	300-375	120-150
Life of Wheel	1½ days	1 day
Average Depth of Cut	.005"—.008"	.001"—.003"
Rejects	None	2%
Finish	Superior	————

*Conservative. Por-os-way has proved ability to grind 8 pcs. per hour, or 100% more than former wheel.

Remarks (by foreman). "My men take pride in their work. If a wheel is too hard and burns work, it means lost time and material and gets them sore. We are sold on the merits of Por-os-way."

2 TO 5 TIMES MORE WAR PRODUCTION PER MAN PER MACHINE

POR-OS-WAY* *a new* RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.
COPYRIGHT, 1943, A. P. de Sanno & Son, Inc.

Dollar Prices Set on Tool Steel Scrap

Washington

• • • **OPA issued on May 5,** Maximum Price Regulation No. 379, effective May 10 for the purpose of regulating prices on tool steel scrap and to expedite recovery of the contained alloys. The regulation removed tool steel scrap from GMPR and placed a dollar and cent price ceiling on five types of segregated scrap.

The five types of segregated tool steel scrap covered by the regulation are based on different amounts of contained tungsten and molybdenum, above a minimum of one per cent tungsten and 1½ per cent molybdenum, with or without cobalt.

Type 1 with a tungsten content of 12 per cent or more, which includes the 18–4–1 type of high-speed steel scrap, carries a maximum price of $1.80 per lb. for the tungsten contained in the form of solids. Other tungsten types are priced at $1.60 and $1.25 per lb. of tungsten in the form of solids, while Types 4 and 5 molybdenum bearing scrap, are at a maximum of 12½ and 13½ cents per lb. of scrap. Lower maximum prices are prescribed for segregated millings and turnings, and for unsegregated scrap.

The dealer differentials on solids range from one to two cents per lb., if the dealer physically segregates the scrap.

An example of the application of these premiums was cited by OPA, as follows:

A dealer buys small lots of mixed tool steel scrap from a number of plants and machine shops. These purchases by the dealer are exempt from price control and the prices paid by him will be determined by negotiations between him and his sellers.

The dealer spark tests the solids bought by him and separates 1000 lb. which, on the basis of the spark test, he judges to contain 12 per cent or more tungsten. He then sells this 1000 lb. to a consumer as segregated Type 1. The consumer excludes 4 per cent or 40 lb. of this lot as being material other than high tungsten (Type 1) scrap and the consumer's analysis of the remaining 960 lb. shows it to be 15 per cent tungsten. If the dealer receives the maximum price for this type of scrap, as set forth in the regulation, his realization on the lot will be as follows:

1000 lb. x 96 per cent = 960 lb. of segregated Type 1

960 lb. x 15 per cent = 144 lb. of contained tungsten

144 lb. x $1.80 = $259.20 total realization before dealer's differential

960 lb. x $.02 = $19.20 dealer's differential.

$259.20 plus $19.20 = $278.40 total dealer realization.

The disposition of scrap excluded by the consumer, which in the above case is 40 lb., is on a basis mutually agreed upon by the seller and consumer. Scrap so excluded is the property of the seller.

However, if the consumer's test or analysis shows that less than 90 per cent by weight of the lot of scrap, as segregated by the dealer, contains 12 per cent or more tungsten, the scrap will be considered as unsegregated and the maximum prices for unsegregated scrap will apply.

•

Idle Aluminum to Be Scrap after June 30

• • • **WPB has announced** it would terminate on June 30 the previously established schedule of prices paid for idle aluminum and would direct such material into normal scrap channels. This new plan will apply to non-usable aluminum reported after that date by holders of idle inventories.

Wherever possible, all materials in primary forms reported on WPB-667 will continue to be moved into war uses in their present forms through direct transactions between holders and buyers. In such transactions the seller, of course, receives the full price as established under OPA regulations.

Owners of aluminum which became idle as a result of WPB conservation orders and which has not yet been reported to the WPB will come under the existing higher-than-scrap price schedule if they report their inventories to the WPB Redistribution Division before June 30.

Metals Reserve Co. carries out the aluminum purchase transactions for the WPB. The newly appointed agent of Metals Reserve Co. for these transactions is Murray Cook, of New York, who also acts as fiscal agent in other redistribution programs.

•

Beryl Ore Prices Get Extensive Increase

Washington

• • • **An increase** in the price of domestic beryl ore from $83.30 to $120 per dry short ton of 10 per cent material was announced this week by the Metals Reserve Co. An increase in the price the company will pay for domestic tantalite ore, under which the producer will receive approximately 50c. per lb of contained tantalic oxide over the former price, also was announced. The company will buy domestic beryl and tantalite-columbite ores in large and small quantities at its various depots.

Price Briefs

• Amendment 53 to the General Maximum Price Regulation allows until May 31 for sellers who made "special deals" during March, 1942, to obtain adjustments of their maximum prices under Section 1499.4b. (OPA-T-829)

•

• General Maximum Price Regulation Order 443 provides an alternate method of determining the maximum price on certain mixed metal products.

•

• Order No. 342 under Maximum Price Regulation 188 provides a price ceiling on purchases of hand tools by the United States and Allied governments, granting the same rates as applicable to large purchasers such as jobbers and wholesalers.

•

• OPA has announced that applications for adjustment and petitions for amendment of price regulations no longer need be sworn to or affirmed.

•

• Action taken in Amendment No. 2 to Maximum Price Regulation No. 272 provides that all transportation charges on less-than-carload shipments from the manufacturer's warehouse to the purchaser's job site may be passed on to the purchaser, if that was the practice of the manufacturer on Oct. 1, 1941.

CMP-24 SUPERSEDES 12 FORMS: This new form to be used for the reporting of aluminum product shipments, exclusive of ingots, is said to supersede 12 previous forms. It is to be used with forms CMP-12-19 and 21 and must be filed for the first time by June 10, according to the Aluminum and Magnesium Division. Ingot is reported on CMP-23.

FORM CMP-24 ALUMINUM (4-29-43)

UNITED STATES OF AMERICA
WAR PRODUCTION BOARD

BUREAU OF THE BUDGET NO. 12-R3024
APPROVAL EXPIRES AUGUST 5, 1943

ALUMINUM SUPPLIERS: MONTHLY REPORT OF SHIPMENTS AND UNFILLED ORDERS

NAME OF REPORTING COMPANY

TO: War Production Board, Washington, D. C.
ATTN: *Aluminum and Magnesium Division, Statistics Unit*

ADDRESS (*Street, City, State*)

INSTRUCTIONS—Each maker or warehouse distributor of an aluminum product listed on instructions shall file *two (2) copies* of this report *not later than the tenth (10th) day of month following month covered by this report.* See full instructions.

REPORT OF SHIPMENTS FOR MONTH OF 194

PRODUCT CODE NUMBER REPORTED (a)	ALUMINUM PRODUCT SHIPPED (*Use separate line for each product code and each program*) (b)	ALLOTMENT NUMBER AND SYMBOL (c)	LEAVE BLANK (d)	NET SHIPMENTS DURING MONTH COVERED BY THIS REPORT (*In lbs.*) (e)	UNFILLED ORDERS AT END OF MONTH ORDERED FOR DELIVERY IN	
					MONTH COVERED BY THIS REPORT (f)	THE PRECEDING MONTHS (g)

Mill Supply Meeting Discusses Government's War-Time Control

Cincinnati

• • • **Government controls** and the operation of industry in war times occupied the attention of mill supply men meeting in a joint "war conference" in Cincinnati Monday, Tuesday and Wednesday of this week. Organizations pooling their membership in the meeting are the Southern Supply & Machinery Distributors' Association, Inc.; National Supply & Machinery Distributors' Association and the American Supply & Machinery Manufacturers' Association, Inc. Speakers from both industry and the government brought messages about the manpower and materials problems to over 1000 men who registered at the Netherland Plaza Hotel for the three-day conference.

Highlighting the early sessions of the affair, manpower came in for much discussion. American industry must fully utilize every available worker, regardless of age, sex, or race, at the highest possible skill, Edward L. Keenan, deputy regional director, War Manpower Commission, told the group. Keenan asserted that 6,000,000 workers are needed this year. The solution of the labor shortage problem is the employment of women and minority groups; that is, Negroes, the speaker reported. Stating that women on the whole are more stable employees than men and are less likely to move around from job to job; Mr. Keenan said that "Whatever the cost or the effort, women must be brought into our war plants or we will fall down on our jobs of producing for victory."

After outlining the various steps through which methods of allocating materials to industry have gone, Henry P. Nelson, assistant to the director, Controlled Materials Plan Division, WPB, then gave to the delegates the procedure under CMP for obtaining materials.

The opening session was called to order by H. P. Ladds, president of the American Supply Machinery Manufacturers' Association, who with H. M. Schramm, president of the Southern Supply & Machinery Distributors' Association, and C. A. Channon, president of the National Supply & Machinery Distributors' Association, gave opening remarks and shared the tasks of presiding at the various sessions. Operations under the OPA regulations were discussed by Philip N. Russell, chief of the hardware and mill supply unit of Consumer Durable Goods Branch, OPA, R. C. Neal, chief, industrial supplies section, Industrial and Hardware Supplies Branch, WPB, and Paul Hartshorn, assistant chief of the same section.

Tuesday was taken over with discussions of the operation of the Industrial and Hardware Supplies Branch of WPB and the tool and steel situation.

Closing sessions were led by members of industry.

Open Hearth Expansion Only 29% Completed; Other Steel Projects Late

Pittsburgh

• • • **Warning that** the steel situation is by no means easy and that third quarter production of finished steel products may be three to five million tons behind requirements, Hiland G. Batcheller, chief of the WPB Steel Branch, disclosed that the steel expansion program was far behind schedule. Batcheller confirmed reports appearing in THE IRON AGE covering the same subject in the Feb. 25 issue.

In January the open hearth expansion was only 23 per cent completed, in February it was 26 per cent completed, and by the end of May it will be only 29 per cent completed, he said. Batcheller said the open hearth program is six months behind schedule and will not be wholly completed until February, 1944. The records indicate that the WPB head's statement that the open hearth program was six months behind schedule was slightly optimistic.

The Electric Steel program, Batcheller said, would be 44 per cent complete by the end of May and would be 100 per cent completed by the end of November. And according to him, the program was three and a half months behind schedule. While this latter statement may apply to the program as a whole, there are many projects which are running six months to a year behind the original completion date.

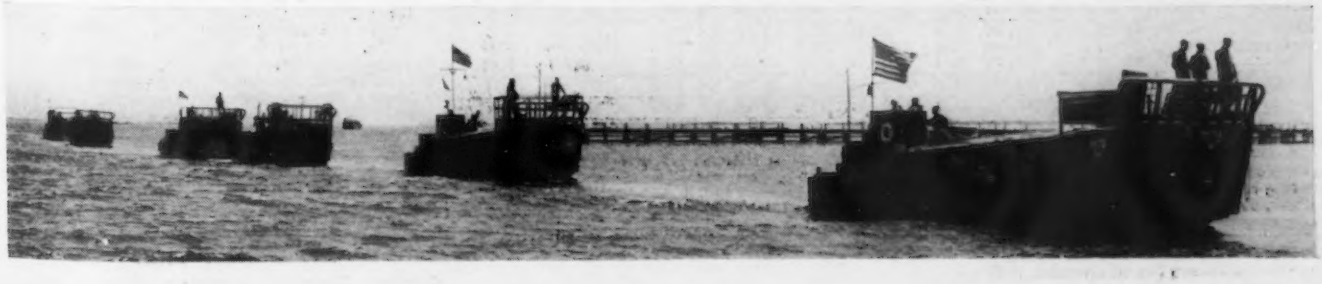
The blast furnace program in January was only 31 per cent completed and according to Batcheller, by the end of May will be only 43 per cent completed. Less than one-half of the program will be completed by the end of November. While the iron and steel head did not disclose the reason for the blast furnace hold-up, it is believed that the shortage of blowing equipment is the main hurdle.

A related story on the subject of steel expansion appears in this issue on page 108.

The by-product coke expansion program is lagging seriously with only 16 per cent of it completed in January and about 30 per cent of it to be completed by the end of May.

The disclosures made by Batcheller are the first official statements on the steel expansion program although there has been much unofficial comment on the situation. The steel expansion projects, incidentally, were designed and approved long before some of the other major undertakings.

HOME AGAIN: Some of the landing craft and staff boats of the Army Engineer Amphibian Command return to Camp Edwards, Mass., after a 38-day training cruise.



April Steel Output Sets 30-Day Peak

• • • **Production of** 7,374,154 net tons of steel ingots and castings in April set a new peak for a 30-day month, according to the American Iron and Steel Institute. The April tonnage was short of the March record of 7,670,187 tons but was substantially above output in April, 1942, when 7,121,291 tons were produced. The previous peak production in the 30-day month was in November, 1942.

Steel production averaged 1,718,917 tons per week during April.

Production of electric furnace steel in April set a new high record of 382,532 net tons as a result of additional furnaces put into service in the last two months. This compared with a production of 381,219 tons in March and 321,324 in April, 1942.

•

• • • **Shipments of** finished steel products by subsidiaries of United Steel Steel Corp. in April totaled 1,630,828 net tons, a decrease of 141,569 tons from March. For the four months ended April 30 shipments totaled 6,780,810 net tons, comparing with 6,895,312 net tons for the same period in 1942.

YEAR 1943

Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute.

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Estimated production—all companies: Open Hearth Net tons*	Open Hearth Percent* of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons*	Electric Percent* of capacity	Total Net tons*	Total Percent* of capacity	Calculated* weekly production all companies (Net tons)	Number of weeks in month
January	6,576,589	97.8	478,058	85.9	369,395	95.4	7,424,042	96.8	1,675,856	4.43
February	6,033,674	99.3	447,843	89.1	344,532	98.6	6,826,049	98.5	1,706,512	4.00
March	6,785,295	100.9	503,673	90.5	381,219	98.5	7,670,187	100.0	1,731,419	4.43
1st Quarter	19,395,558	99.3	1,429,574	88.4	1,095,146	97.5	21,920,278	98.4	1,704,532	12.86
April	6,509,812	99.9	481,810	89.4	382,532	102.1	7,374,154	99.3	1,718,917	4.29
May										4.43
June										4.29
2nd Quarter										13.01
1st 6 months										25.87
July										4.42
August										4.43
September										4.28
3rd Quarter										13.13
9 months										39.00
October										4.43
November										4.29
December										4.42
4th Quarter										13.14
2nd 6 months										26.27
Total										52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943, as follows: Open hearth 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons.

* Revised January through February, 1943

YEAR 1942

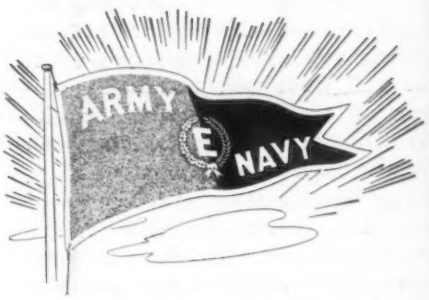
Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute.

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Estimated production—all companies: Open Hearth Net tons*	Open Hearth Percent* of capacity	Bessemer Net tons*	Bessemer Percent* of capacity	Electric Net tons*	Electric Percent* of capacity	Total Net tons*	Total Percent* of capacity	Calculated* weekly production all companies (Net tons)	Number of weeks in month
January	6,322,215	95.3	490,874	86.0	299,017	94.2	7,112,106	94.5	1,605,442	4.43
February	5,785,918	96.6	453,549	88.0	273,068	95.2	6,512,535	95.9	1,628,134	4.00
March	6,572,930	99.0	493,191	86.4	325,990	102.7	7,392,111	98.2	1,668,648	4.43
1st Quarter	18,681,063	97.0	1,437,614	86.7	898,075	97.4	21,016,752	96.2	1,634,273	12.86
April	6,345,133	98.7	454,834	82.2	321,324	104.5	7,121,291	97.7	1,659,975	4.29
May	6,595,440	99.4	453,938	79.5	333,200	104.9	7,382,578	98.1	1,666,496	4.43
June	6,239,674	97.1	452,528	81.8	323,100	105.1	7,015,302	96.3	1,635,269	4.29
2nd Quarter	19,180,247	98.4	1,361,300	81.2	977,624	104.8	21,519,171	97.4	1,654,049	13.01
1st 6 months	37,861,310	97.7	2,798,914	83.9	1,875,699	101.1	42,535,923	96.8	1,644,218	25.87
July	6,345,315	95.7	453,686	79.6	345,957	96.6	7,144,958	94.5	1,616,506	4.42
August	6,414,637	96.5	467,293	81.8	345,725	96.3	7,227,655	95.4	1,631,525	4.43
September	6,286,855	97.9	437,961	79.4	332,703	95.9	7,057,519	96.4	1,648,953	4.28
3rd Quarter	19,046,807	96.7	1,358,940	80.3	1,024,385	96.3	21,430,132	95.4	1,632,150	13.13
9 months	56,908,117	97.3	4,157,854	82.7	2,900,084	99.4	63,966,055	96.3	1,640,155	39.00
October	6,750,829	101.5	461,897	80.9	366,788	102.2	7,579,514	100.0	1,710,951	4.43
November	6,371,750	99.0	458,469	82.9	349,593	100.5	7,179,812	97.8	1,673,616	4.29
December	6,471,261	97.6	475,204	83.4	358,075	100.0	7,304,540	96.6	1,652,611	4.42
4th Quarter	19,593,840	99.4	1,395,570	82.4	1,074,456	100.9	22,063,866	98.2	1,679,137	13.14
2nd 6 months	38,640,647	98.0	2,754,510	81.3	2,098,841	98.6	43,493,998	96.8	1,655,653	26.27
Total	76,501,957	97.9	5,553,424	82.6	3,974,540	99.8	86,029,921	96.8	1,649,979	52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons, based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons Bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, Bessemer 6,721,400 net tons, electric 4,225,890 net tons.

* Revised January through December, 1942.



Cited for Award

• • • **Listed below** are the companies recently awarded the Army-Navy "E" for outstanding war production:

American Brass Co., Kenosha Brass Co., Kenosha, Wis.
American Locomotive Co., Railway Steel Spring Division, Latrobe, Pa.
American Machine & Metals, Inc., East Moline, Ill. (star).
Ampco Metal, Inc., Milwaukee.
Barberton Works, Babcock & Wilcox Co., Barberton, Ohio (second renewal).
Borg-Warner Corp., Rockford Drilling Machine Division, Plants Nos. 1, 2 and 3, Rockford, Ill.
Brass Foundry Co., Peoria, Ill.
D. W. Onan and Sons, Arrowhead, Madison, Royalston and University Plants, Minneapolis.
Defiance Machine Works, Inc., Defiance, Ohio.
E. I. du Pont de Nemours & Co., Inc., Perth Amboy Electro-chemical Plant, Perth Amboy, N. J.
Geometric Tool Co., New Haven, Conn.
George D. Roper Corp., Rockford, Ill.
John Royle & Sons, Paterson, N. J.
Lindberg Steel Treating Co., Chicago.
Lufkin Rule Co., Saginaw, Mich.
Mahoning Valley Steel Co., Niles, Ohio.
Merritt, Chapman & Scott Corp., Escanaba By-Pass Project, Escanaba, Mich.
Minneapolis-Moline Power Implement Co., Como Ordnance Plant, Minneapolis.
Mueller Co., Decatur, Ill.
Nashawena Mills, New Bedford, Mass.
National Enameling and Stamping Co., Granite City, Ill.
Philco Corp., Storage Battery Division, Philadelphia.
Proteotoseal Co., Chicago.
Thomson Co., Thomson, Ga.
United States Metals Refinery Co., Carteret Plant, Carteret, N. J.
United States Rubber Co., Shelbyville Mills, Shelbyville, Tenn.
Vaughan Novelty Mfg. Co., Chicago.
Worthington Pump & Machinery Corp., Moore Steam Turbine Division, Wellsville, N. Y.
Youngstown Metal Products Co., Youngstown Sheet & Tube Co., Youngstown.

MARITIME COMMISSION "M"

Barberton Works, Babcock & Wilcox Co., Barberton, Ohio (renewal).

MINUTE-MAN FLAG

Quaker Chemical Products Corp., Conshohocken, Pa. (Bull's eye insignia).

PERSONALS

• **Lloyd Arnold** has been named assistant to vice-president, finance, of American Steel & Wire Co. At the same time, **Ralph Raymond** was appointed supervisor of organization planning, succeeding Mr. Arnold. Mr. Arnold held various positions with American Steel & Wire Co. since 1900, and in October, 1938, was appointed supervisor of organization planning, which position he held until the present time. Mr. Raymond goes to his new position from the U. S. Steel Corp. of Delaware in Pittsburgh, where, since May, 1942, he has been staff assistant in the organization planning division.

• **Earl F. Reed,** member of the law firm of Thorp, Bostwick, Reed & Armstrong, Pittsburgh, has been elected a member of the board of directors of National Steel Corp., Pittsburgh. Mr. Reed succeeds as director his former law partner, the late Charles M. Thorp, who was a director of National Steel from its formation in 1929, and of its predecesor and now subsidiary, Weirton Steel Co., since its incorporation in 1905.

• **Harry L. Frevert,** president of the Midvale Co. since 1931, has been elected to the position of chairman of the board, and **Francis Bradley,** formerly vice-president, was elected president. **George E. Smith,** who for some years has been general superintendent of the company, was elected vice-president. Elected to the executive committee were **Charles E. Brinley,** chairman; **Edward Hopkinson, Jr.,** and **James E. Gowen,** with Mr. Frevert and Mr. Bradley members ex-officio. **Ralph Kelly,** president of the Baldwin Locomotive Works, was elected a director of the Midvale Co. to fill a vacancy caused by an increase in the membership of the board.

• **J. E. Fields,** vice-president, Chrysler Corp., retired May 2, his 65th birthday. He had been an officer of the corporation since 1925 and a director since 1927, and will continue to hold the latter office although he has relinquished active participation in Chrysler's executive management.

• **Kam N. Kathju,** research and consulting chemist, has been appointed technical director of the Arco Co., Cleveland, manufacturers of infra-red reflecting camouflage paints. He entered the Ford Motor Co. organization in 1923 and joined the Ford Plant Laboratory staff the following year as research chemist. He joined the Cook Paint & Varnish Co. in 1927 as lacquer chemist. Mr. Kathju became associated with the Arco Co. in 1934, at Detroit, as consulting chemist.

• **M. W. Heinritz,** general manager of the Storage Battery Division since 1938, has been named vice-president in charge of the Storage Battery division of Philco Corp. Mr. Heinritz's first assignment with Philco was the sale of storage batteries to the mining industry in northern West Virginia. Thereafter he was transferred to the Pittsburgh and, later, to the Chicago branch offices to handle sales.

• **W. O. Lippman** has been named manager of Westinghouse Electric & Mfg. Co.'s Canton Ordnance Division to succeed **R. V. Gavert** who is being transferred to another Westinghouse plant. Mr. Gavert, who joined the Westinghouse Company in 1914, was manager of manufacturing at the Westinghouse Transformer Division in Sharon, Pa., prior to his transfer to Canton. For the past four years Mr. Lippman has been works manager of the Westinghouse Electric Appliance Division's plant in East Springfield, Mass.

• **Charles A. Butcher,** formerly assistant to the national manager of Westinghouse's district manufacturing and repair department, has been named manager of that department for the entire Pacific Coast District of Westinghouse. Mr. Butcher will succeed **R. E. Powers,** who has resigned. The new Pacific Coast District manufacturing and repair manager will have charge of activities of his department in a territory comprising all or parts of 11 Western states, Alaska and the Hawaiian Islands. From 1929 to 1936, Mr. Butcher served as Eastern engineering manager with headquarters at New York. He spent the following five years as Eastern district service manager there, then in late 1941 was transferred to East Pittsburgh and named assistant to the national manager of the district manufacturing and repair department.

• **N. R. Knox** has been elected president of Bucyrus-Erie Co., South Milwaukee, Wis. **W. W. Coleman,** company president for 32 years, was re-elected chairman of the board. **George A. Morison,** former vice-president, was elected vice-chairman of the board. **W. L. Litle** was elected vice-president, and will be in charge of the company's plants at Erie, Pa., and Evansville, Ind. Appointed officers now include **W. M. Bager,** technical director; **D. P. Eells,** vice-president with special assignments; **P. H. Birckhead,** vice-president in charge of the sales department; **R. W. Newberry,** vice-president in charge of the commercial department; **C. K. Charlton,** assistant to the president.

• **Judson C. Travis,** assistant to the president, has been elected a director of Handy & Harman after completing 25 years of company service. He has headed up sales and advertising activities of Handy & Harman for many years and five years ago became assistant to Mr. G. H. Niemeyer, the company's president. Mr. Travis takes the place, on the Handy & Harman board of directors, of H. H. DeLoss recently deceased.

• **Everett Chapman,** who has been president of Lukenweld, Inc., Coatesville, Pa., since 1936, has resigned. Mr. Chapman will establish his own consulting engineering business, and will number Lukens Steel Co. among his clients. After teaching electrical engineering at Purdue University and serving as an experimental engineer with Lincoln Electric Co. in Cleveland, Mr. Chapman joined Lukenweld in 1930 as director of development and research. In 1934, Mr. Chapman was elected vice-president of Lukenweld, and was elected president in 1936.

• **C. E. Powell** has been appointed manager of the machinery department of the R. D. Wood Co., Philadelphia. Mr. Powell joined the R. D. Wood Company in 1936. In addition to numerous improvements and patents on machine and control designs, he has contributed many ideas during the present war crisis to high speed press and control design for the hydraulic forging of non ferrous and aircraft metals, also to valve control for the countries largest and fastest high speed ferrous metals hydraulic forging presses. He has served as a hydraulic engineer with Pittsburgh Crucible Steel Co. and sales engineer with Worthington Pump & Machinery Corp. In 1925 he entered the employ of Homestead Valve Mfg. Co., becoming chief engineer and production manager.

• **Henry D. Miles,** formerly president, has been elected chairman of the board of Buffalo Foundry & Machine Co. **Charles W. Pearson,** formerly executive vice-president, has been made president; **Milo T. Siverling,** has been promoted from vice-president to executive vice-president and general manager, and **L. Clayton Vallier,** treasurer, has been elected secretary and treasurer.

• **David G. Forman,** one of the earliest employees of Bell Aircraft

Corp., Buffalo, has been appointed executive assistant to Lawrence D. Bell, president.

• **Edward J. Barcalo,** for 40 years president of the Barcalo Mfg. Co., Buffalo, has emerged from retirement to become chairman of the labor requirements committee which will determine the quotas of employment under the controlled referral hiring plan when, as and if it becomes effective. His appointment has been approved by both labor and management.

• **J. Paul Ahlbrandt** has been recently named chief engineer of Midwest Mfg. Co., Galesburg, Ill. For the past 15 months Mr. Ahlbrandt has been working for the government. His last position was production engineer, Power Division, Office of War Utilities of WPB. For eight years prior to going with the government, Mr. Ahlbrandt was with Ingersoll Steel & Disc Division of Borg-Warner Corp., Chicago. He was manager of ordnance production at the time he left Ingersoll's.

• **Edward A. Beidler,** chemical engineer, has been appointed to the research staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to its division of nonferrous metallurgy.

• **C. C. Hermann** has been appointed general manager of the Claude B. Schneible Co., Chicago, and **L. C. Beers** has been named sales manager. Mr. Hermann joined the Schneible organization in 1937 as sales engineer in charge of the Philadelphia office. In 1941 he became chief engineer of the company. Mr. Beers also joined Schneible in 1937, being district sales representative in Detroit and in New England before entering the Chicago office as assistant sales manager.

• **William Ivey,** who was commissioner of labor for the state of Alabama under the state administration that ended last January, has been appointed labor relations manager by Bechtel-McCone-Parsons for the corporation's Birmingham operations.

• **Herbert M. Rich, Jr.,** has been appointed to the post of district manager of Electro Metallurgical Sales Corp. Prior to his association with Electro Metallurgical Sales Corp. in New York last year, Mr. Rich was employed by Hickman, Williams & Co. at Detroit, where he had been in charge of the sale of ferro-alloys, pig iron, and metallurgical coke.

• **Norman F. Smith,** vice-president and general manager of the Osborn Mfg. Co., Cleveland, has been elected president of the American Brush Manufacturers Association at the 26th annual convention of that organization held at Rye, N. Y.

• **Ralph W. Young,** works manager, and **K. Y. Taylor, Jr.,** general superintendent, Charles H. Besly & Co., Beloit, Wis., have been promoted to vice-presidents, Mr. Young to be in charge of engineering and Mr. Taylor, in charge of manufacturing.

• **James Tate,** prominent Milwaukee advertising executive and former vice-president and general manager of the Delta Mfg. Co., has joined the Dumore Co., Racine, as director of industrial marketing and manufacturing programs.

• **John H. Moore,** formerly Western New York representative for the Training Within Industry Division, War Manpower Commission, has been appointed director of training for Bell Aircraft Corp., Buffalo. He will be in charge of all employee training.

• **L. M. Ferris,** sales manager of the automotive division of Park Chemical Co., Detroit has been appointed general sales manager.

• **James S. Rutherford** has been appointed chief financial analyst, price adjustment section, Chicago Ordnance District. Mr. Rutherford is on leave of absence from the brokerage firm of Norris & Kenly to assist in renegotiation of contracts for ordnance material.

• **C. J. Maloney,** Chicago district manager for Cutler-Hammer, Inc., was recently elected president of the Electric Association for the 1943 term. Mr. Maloney started with Cutler-Hammer in 1914 in the student engineer's course, then went to the New York and Philadelphia districts. Mr. Maloney transferred to the Chicago office in June, 1925.

• **Burton F. Stauffer,** assistant general manager of the Industrial Products Sales division of the B. F. Goodrich Co., celebrated his 50th anniversary with the company in April.

• **Wm. A. Streich,** formerly secretary and treasurer of Superior Steel Corp., has been named vice-president and treasurer. He has been with the company in various capacities for the past 14 years.

• **Morris Kaplan,** Cambridge, Mass., chairman of the New England Auto-Wreckers Conference, has been made a member of the WPB advisory committee.

• **Dr. Ansel St. John** is on leave from the St. John X-Ray Service, Inc., while serving the Ordnance Department, Washington, as senior metallurgist.

• **M. W. Cardwell** has been appointed comptroller of Warman Steel Casting Co., Los Angeles. Other appointments announced recently by the company include **W. C. Burger,** sales manager; **E. B. Westall,** plant metallurgist; and **W. B. McCartney, Jr.,** production engineer.

• **G. C. Brown** has been named Detroit engineering representative for Aircraft Screw Products Co., Inc. From 1928 to 1942 Mr. Brown was sales engineer for the Bohn Aluminum & Brass Corp., and the Dow Chemical Co. He has made a specialty of the design of aluminum and magnesium castings.

• **J. J. McIntosh** has been named southeastern sales representative and **B. F. Coombs** Texas sales representative of Greene, Tweed & Co., New York. Mr. McIntosh has had many years of industrial sales experience. His headquarters will be in Atlanta. Mr. Coombs is known throughout the eastern Texas and western Louisiana oil industry, which he will cover from headquarters at Houston, Tex.

• **William T.** Streicher has been assigned to the bronze bearing service of the Bunting Brass & Bronze Co. in Michigan. He has been in charge of the company's sales and service operations in Chicago, where he is being replaced by **Martin R. Howe,** recent New England representative, who will also cover St. Louis and southern Wisconsin.

• **Arthur B. Parnall** has been appointed treasurer of the Osborn Mfg. Co., Cleveland. With Osborn for the past 17 years, Mr. Parnall has successively held the positions of chief accountant and controller.

• **George T. Kearns,** for the last five years comptroller for the Delta Mfg. Co., Milwaukee, has accepted an executive position with the McKenna Metals Co., Latrobe, Pa. He will be succeeded at Delta by **Robert Hofer,** formerly with Ernst & Ernst, accounting firm of Chicago.

• **Y. R. Yarnall,** formerly with the Bellanca Aircraft Corp., New Castle, Del., and **H. H. Savage,** Philadelphia attorney, were elected to the positions of treasurer and secretary, respectively, of the Kellett Autogiro Corp., Philadelphia. Mr. Yarnall was vice-president and treasurer of the Bellanca Aircraft Co. until March, 1943, when he resigned to work as comp-

troller of that same company. **Mr. Savage** has been the head of the legal department of the Kellett Company for the past two years. Prior to this, he served with the legal department of the American Gas Co. and the Philadelphia Electric Co. **William F. Palmer,** secretary and treasurer of the Kellett Autogiro Corp. since 1929, resigned recently and is now associated with the Luscombe Aircraft Co., West Trenton, N. J., in the same capacity.

• **John W. Haddock,** formerly vice-president in charge of engineering and sales for the Sullivan Machinery Co., Michigan City, Ind., has been elected president of Farrel-Birmingham Co., Inc., of Ansonia, Conn., and Buffalo, N. Y. He succeeds Nelson W. Pickering, now in naval service. Mr. Haddock joined Farrel-Birmingham May 1.

• **Henry F. Schippel,** of the B. F. Goodrich Co., Akron, Ohio, has returned to the United States after nearly a year in Africa where he was project engineer in charge of rubber products at two large American repair and maintenance bases. Mr. Schippel has been assigned to special engineering duties with the company's aeronautical division. In his new assignment he will devote full time to aeronautical problems.

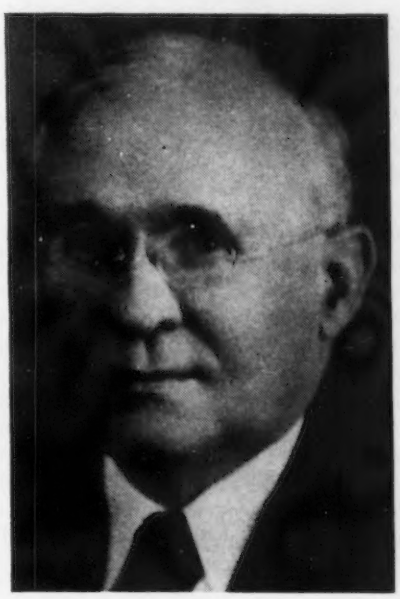
• **Dr. Frank K. Schoenfeld** has been named technical superintendent of the chemical division of the B. F. Goodrich Co. He had been, for several years, in charge of the Koroseal research and development laboratories. In his new post he succeeds **Dr. Robert V. Yohe,** recently named manager of the Kentucky synthetic rubber plant operated by the company for the government.

• **F. W. Boynton** and **T. W. Hardy** have been elected vice-presidents of Bendix Home Appliances, Inc., South Bend, Ind. Mr. Boynton, with the company since its inception, and Mr. Hardy, since 1939, hold executive positions in the manufacturing divisions of the company.

• **Harold F. Haase,** chemical engineer, has been appointed to the staff of Battelle Memorial Institute, Columbus, Ohio, where he will be engaged in electrochemical research. His former affiliations include research positions with the A. O. Smith Corp. and the American Can Co.

• **Axel S. Hellstrom,** formerly associated with the Broden Construction Co., subsidiary of the Wean Engineering Corp., is now a member of the staff of the Parsons Engineering Corp., Cleveland.

E. ROBERT ISBELL, division manager, The Aviation Corp., Toledo, Ohio, and WILLIAM H. HARMAN, president, William Sellers & Co., Inc., Philadelphia.



• **E. Robert Isbell** has been appointed division manager of the Aviation Corp., Toledo, in charge of its subsidiary, American Propeller Corp. and of its Liquid Cooled Engine Division. For the past several months Mr. Isbell has been in charge of coordinating plant construction and organizational setups for these two divisions, both at Toledo. He joined Aviation Corp. after eight years with Fisher Body Corp., during which he had charge of setting up assembly and manufacturing plants for that concern throughout the United States. Prior to that time he had been for seven years coordinator for the export division of General Motors, in which capacity he became familiar with plant construction problems in Europe, Mexico and elsewhere.

• **William H. Harman** has been elected president of William Sellers & Co., Inc., Philadelphia. Mr. Harman has been associated with the Baldwin Locomotive Works since 1928 and during the last five years served as vice-president in charge of sales for the Baldwin group. From 1915 to 1928 he was president of the Southwark Foundry & Machine Co., now a division of Baldwin. He will remain a director of the Baldwin Locomotive Works.

• **Wayne D. Dukette** has been appointed manager of the railroad sales department of Joseph T. Ryerson & Son, Inc., succeeding J. P. Moses, who has held this position for many years. Mr. Moses will continue in the railroad sales organization in an advisory capacity. **Roland W. Burt,** who is manager of eastern railroad sales, located at the Ryerson Jersey City Plant, will continue in this position.

• **Robert L. Johnson,** president of Temple University, Philadelphia, has been elected a director of the Armstrong Cork Co.

• **R. J. Swartout** has been elected vice-president of the Belle City Malleable Iron Co., Racine, Wis., succeeding the late J. M. Stone. Other advancements announced by the company include the election of **L. W. Brann** as treasurer to succeed the late Stanley Kitto, and the appointment of **Harry Thorson** to the post of assistant treasurer. Mr. Thorson previously held the position of purchasing agent and in his new position will combine the duties of purchasing agent and assistant treasurer. Mr. Swartout, the new vice-president, has been associated with Belle City and its subsidiary company, the Racine Steel Castings Co., since 1919 when he served as office manager. Prior to that time he was associated with International Harvester Co. Mr. Brann was employed by the Government as chief auditor on government contracts in the Racine-Milwaukee area previous to his present position with Belle City.

• **H. F. Wardell,** executive vice-president, Detroit Steel Products Co., has been elected president. **V. F. Dewey,** president and general manager for the past 25 years, is named chairman of the board. **R. W. Weed,** eastern sales manager, was made vice-president.

• **Robert Insley** has joined Continental Motors Corp. as vice-president and executive engineer. In recent years he has been vice-president in charge of engineering of Menasco Mfg. Co. and assistant chief engineer at Pratt & Whitney. **Peter Altman,** formerly with Consolidated-Vultee, has been retained as a special engineering consultant.

• **T. F. Thornton,** vice-president of Standard Tube Co., has been named president and a director. He succeeds president **George B. Storer,** who resigned to accept a commission as a lieutenant commander in the Navy.

• **Alden Horton** has been appointed purchasing and procurement officer of Schick, Inc. For the past 20 years he has been purchasing agent for the Hardinge Co. and its subsidiary, the Steacy-Schmidt Mfg. Co., of York, Pa., resigning the position to join Schick. Previously he had worked for the Missouri Pacific and Union Pacific railroads.

• **Dr. Leo Schapiro** has been appointed chief metallurgist and general superintendent of Southwest Steel Rolling Mills, Los Angeles. Dr. Schapiro has had more than 15 years' experience in the heat treating, rolling, and melting of carbon and alloy steels by the open hearth and electric furnace processes. He was recently assistant chief metallurgist at the U. S. Steel Corp. South Works, Chicago, and was research metallurgist in that plant for several years.

• **Howard Handyside** has resigned as office manager and **Frank Quigley** as membership supervisor of the American Society of Tool Engineers. Both are entering war industries. **Howard M. Witt** recently became assistant to the executive secretary of the organization.

• **Dr. Robert M. Burns,** new president of the Electrochemical Society, is senior author of the monograph "Protective Coatings for Metals." His principal researches have been in electrochemistry and corrosion, and he has contributed to the development of corrosion preventive methods and the evaluation of protective coatings. In 1921 he became a research chemist for the Barrett Co., and for a year was employed upon an investigation of the catalytic oxidation of hydrocarbons. In 1922 Dr. Burns joined the engineering department of Western Electric Co., which in 1925 became the Bell Telephone Laboratories. Since 1931 he has been assistant chemical director of that organization.

• **James L. Francis** has joined the metallurgical staff of the Meehanite Metal Corp., New Rochelle, N. Y. Mr. Francis was formerly connected with the Vulcan Foundry Co., Oakland, Cal.

• **Ralph Z. Sorenson** has been appointed manager of the table appliance department of the Westinghouse Electric Appliance Division, Mansfield, Ohio, succeeding John A. Sullivan who resigned to become a lieutenant in the United States Naval Reserve. Mr. Sorenson joined the Westinghouse Electric & Mfg. Co. as supervisor of major accounts for the Northwestern District, with headquarters at Chicago. In January, 1941, he became appliance supervisor for the same district.

• **Frank E. McGary,** engineering and mechanical division chief of Murray Corp. of America, has been appointed manager of Murray's new Scranton, Pa., plant, now under construction. Mr. McGary joined Murray in 1940, having previously been associated with Budd Mfg. Co. Chief engineer **O. F. Graebner** has been appointed to the post formerly occupied by Mr. McGary.

• **J. Stuart Sneddon** has been appointed vice-president in charge of sales of the H. K. Ferguson Co., Cleveland and New York. Mr. Sneddon has been in charge of construction for the organization during the past year. **Clarence McDonough,** who has been assigned to special work in connection with the synthetic rubber and ordnance plant construction handled by the firm, will resume his former position as vice-president in charge of construction.

• **Bernard M. Brockman** has been appointed vice-president and general sales manager of the R. K. LeBlond Machine Tool Co., Cincinnati. Mr. Brockman succeeds Henry Pierle, who died a short time ago. For eight years Mr. Brockman has been in charge of the Chicago office, and prior to the opening of this office he was with LeBlond's representative, the Federal Machinery Sales Co., having served with that company for 16 years. **Donald Whittacre** will succeed Mr. Brockman, in charge of the Chicago office.

• **Gordon W. Cameron** for the past 18 years manager of the Aluminum Co. of America Boston office, has been elected treasurer to succeed **R. E. Withers** who will continue with the company as senior vice-president in charge of finance.

• **A. M. Wibel** has resigned as vice-president in charge of purchases of Ford Motor Co. Mr. Wibel, who has been in poor health recently, is one of the veterans of the Ford organization, having joined the company in 1912 as an engineering clerk. Put in charge of purchasing in 1927, he became vice-president of the company in 1941. His successor has not yet been announced.

• **Frank H. Robb** has been named manager of the manufacturing and repair department, Westinghouse Electric & Mfg. Co. for the Los Angeles area. He will succeed Charles G. Yarbrough, who has retired after 47 years with the company. In 1927, Mr. Robb was made manager of the company's service department at Bridgeport, Conn., and in 1932 went back to Springfield as service manager for both Bridgeport and Springfield plants. In 1934 he was named manager of the manufacturing and repair department at Springfield, a post he held until his transfer to the West Coast.

• **Dr. H. L. Frevert,** formerly president, has been made chairman of the board of the Midvale Co., Philadelphia. **Francis Bradley,** formerly vice-president, has been made president. **George E. Smith,** formerly general superintendent, has been made vice-president.

• **Earl F. Reed,** member of the law firm of Thorp, Bostwick, Reed and Armstrong, of Pittsburgh, has been elected as a director of National Steel Corp. Mr. Reed succeeds as director the late Charles M. Thorp.

• **H. R. Bazley** has been elected president of All American Aviation, Inc., succeeding Richard C. du Pont, who resigned as president and chairman to become special civilian assistant to the Commanding General of the Army Air Forces where he will have charge of the glider program. Mr. Bazley has been vice-president of All American in charge of operations and was formerly assistant director of aeronautics of Pennsylvania and director of aviation of Allegheny County, Pa. Mr. du Pont has been president of All American since it was organized five years ago to operate and develop the air mail pick-up system.

• **Austin H. Kuhns,** recently elected vice-president and engineer of Farrell-Birmingham Co., Inc., has moved his headquarters from Buffalo to New York City.

• **T. F. Thornton,** formerly vice-president in charge of sales, succeeds George B. Storer as president of the Standard Tube Co., Detroit. Mr. Storer has resigned to accept a commission as lieutenant commander in the Navy.

• **S. Leroy Crawshaw** has accepted a position as plant manager of the Lynwood Plant of the Western Gear Works, Calif. Mr. Crawshaw was formerly with the Westinghouse Electric & Mfg. Co., Pittsburgh, for 24 years.

• **Roe S. Clark,** president; **H. H. Kerr,** vice-president; and **George A. Seyler,** second vice-president and treasurer of the National Metal Trades Association, Chicago, have been re-nominated to serve a second term.

• **Cedric William Lutz** has been appointed purchasing agent of the radio division of Westinghouse, Baltimore. **Earle Megathlin** has been appointed assistant purchasing agent. Mr. Lutz joined Westinghouse in 1939 as assistant to the general manager of purchases and traffic in Pittsburgh and was named assistant purchasing agent of the company's steam division in Philadelphia in 1941, holding that position until named to his present post. Mr. Megathlin comes from Mansfield, Ohio, where he served since 1940 as buyer and since 1942 as assistant purchasing agent.

• **Arthur S. Allen,** widely known Munsell System colorist, has been retained by the Hinde & Dauch Paper Co., Sandusky, Ohio, as color consultant.

• **Fred L. Williams,** formerly with Pratt & Whitney, will handle sales for Darwin & Milner, Cleveland, in New England. **Frederick J. Herr,** formerly of Vanadium-Alloys Steel Co., will handle the line in the southwestern Ohio territory. **Ray A. Lackner** will handle the Pittsburgh territory.

• **G. H. Niemeyer,** president of Handy & Harman, New York; **C. W. Handy,** chairman; **R. H. Leach,** vice-president; **H. W. Boynton,** treasurer and **H. W. Spaulding,** secretary; have all been re-elected to those offices. **Judson C. Travis,** formerly assistant to the president and recently elected to the board of directors, to replace the late H. H. Deloss, was elected vice-president in charge of sales.

• **J. M. McLeod,** formerly assistant sales manager of the Elmira, N. Y., plant of Hardinge Bros., Inc., is now associated with Ray H. Morris as district manager of the Hartford office.

OBITUARY...

• **W. Arnold Houser,** general parts and service manager of the Cadillac Division of General Motors Corp., died May 4 at Detroit. At the time of his death he was director of the company's tank school and training program.

• **Alden M. Hammond,** senior partner of Hammond-Goff Co., Providence, died April 11.

• **Harry A. Miller,** famous designer and builder of racing autos, boats and airplanes, died May 3 at Detroit. His "Miller Specials" won eleven Indianapolis Speedway races and his Miller 151 marine engine set a world's hydroplane speed record in 1927.

• **Albert L. Austin,** sales engineer of Robins Conveyors Inc., Passaic, N. J., died Sunday, May 2, after a protracted illness. Mr. Austin joined the Mead-Morrison Mfg. Co. as draftsman in 1915. When Robins took over the coal and ore handling products of Mead-Morrison in 1934, Mr. Austin became a Robins Sales Engineer.

• **Fred S. Denison,** engineering executive of the Minneapolis-Honeywell Regulator Co. and winner of the National Association of Manufacturers' Pioneer award in 1940, died in Minneapolis. He was 56 years old.

• **August T. Sebelien,** secretary-treasurer of the Davenport-Besler Corp., died recently.

• **J. Ward Henry,** former superintendent of the Electro-Alloys Co., Elyria, Ohio, died recently.

• **Alphonse J. Reddy,** assistant general master mechanic of aircraft production for Packard Motor Car Co., died recently. Mr. Reddy had been with Packard 31 years.

• **W. J. Wooldridge** died at his home near Pittsburgh April 6 at the age of 70. Mr. Wooldridge devoted his entire business career to the distribution of silicon steel sheets. He was associated with W. S. Moody of the General Electric Co., Pittsfield, Mass., while Mr. Moody was doing the earliest engineering work on these materials, and was later associated with a number of producers of silicon sheets. In 1933 he joined the Allegheny Ludlum Steel Corp., Brackenridge, Pa., as head of silicon sheet sales, continuing in that capacity until his partial retirement.

• **Abraham J. Grossman,** president, Grossman Iron & Metal Co., St. Louis, died recently of heart disease. He was vice-president of the St. Louis chapter of the Institute of Scrap Iron and Steel, Inc.

• **James W. Rickey,** 71, former chief hydraulic engineer of the Aluminum Co. of America, Pittsburgh, died April 19 at Washington, after a prolonged illness. Mr. Rickey retired in 1937 after serving the company in that position 30 years but continued as a member of the company's consulting staff.

• **Perry Critchley Thomas,** 55, vice-president of Eastern Gas & Fuel Associates in charge of operations of its Koppers Coal Division, Pittsburgh, died April 19 after several months' illness. Mr. Thomas joined the Koppers Coal Co. in 1928 as manager of mines and later became vice-president and general manager. He was named vice-president in charge of coal operations when the company became a division of Eastern Gas & Fuel Associates.

• **Albert H. Loveley,** manufacturer's agent for the Zerotol Zapon Zerotol Division of Atlas Powder Co., died recently. In the early days of the auto industry Mr. Loveley was a purchasing agent for Packard and the E. R. Thomas Motor Car Co.

• **Harry G. Seeboth,** 52, president of the Milwaukee Bronze Casting Co., Milwaukee, died recently at Tucson, Ariz., after a long illness. He had been associated 33 years with the firm, which was founded by his father.

• **Elmer O. Goodridge,** 81, retired plant engineer for the U. S. Rubber Co., died in Melrose, Mass., April 20. Mr. Goodridge was graduated from the University of Maine and later from the Hampton Institute, Virginia, as a mechanical engineer.

• **Edward C. Voorhees,** 65, one of the first representatives of the American steel industry to study the science of metallurgy, died April 24. With several other young American engineers, Mr. Voorhees spent three years in European laboratories studying under and collaborating with scientists who were developing metallurgy at the beginning of this century. Following his return to this country, he located at the Midvale Co. in Philadelphia for several years, spent a short time in Detroit, and went to Erie early in 1915. He was with the Erie Forge Co. from that time until his retirement in 1940, after which he made his home in Somerville, N. Y.

MACHINE TOOLS

. . . Sales, Inquiries and Market News

Renegotiation Chief Topic At Meeting

Cleveland

• • • **The main topic of discussion** at the St. Louis meeting of the Associated Machine Tool Dealers of America, May 3 and 4, revolved around the three most talked of problems of the machine tool industry — renegotiation of contracts, order cancellations and the disposal of surplus equipment in the post-war market. Cancellations themselves seem to have become stabilized from a general standpoint, and concerning surplus tools, like the weather, much was said but little could actually be done about the situation.

However, serious consideration at the dealers' conference was given to renegotiation. Because of the inability to set standards or work out an all-over pattern applicable to various war production firms, the renegotiation of contracts seems to be proceeding in a hit and miss fashion that bodes no good either to the manufacturer or to the renegotiating committees.

At present, war production plants are facing the terrors of renegotiation from at least five quarters: The Army, Navy, Air Corps and Chemical Warfare agencies have been actively engaged in renegotiating contracts, and the manufacturer must still hold himself in readiness for DPC renegotiation which will probably come at a much later date. On top of this, most of the renegotiating is done by district committees with no apparent uniformity of procedure or purpose. While one district may ask for certain information and decide on certain profit allowances, another district, perhaps adjacent to the first, will ask for entirely different information and decide on a different profit allowance.

There has been too much of a feeling that the manufacturer is out to gyp the government. Perhaps this is so in some isolated instances, but a great majority believe wholeheartedly in the renegotiating principle. Their chief interest, however, is in a fair settlement.

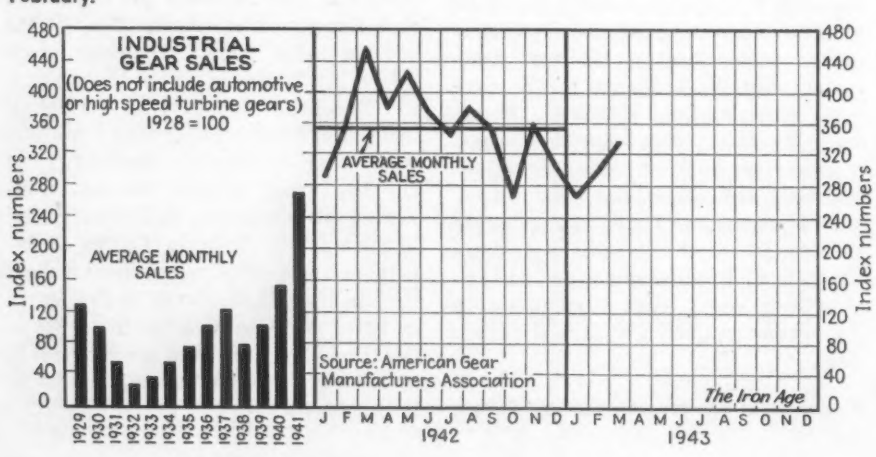
Meanwhile, it has been reported that Washington is purposely holding up final settlements on renegotiations where the investigations have been completed and checks mailed to Washington. The stated reasons for this holdup is that because of the nonuniformity of renegotiating procedures, there is fear of legal reprisals by manufacturers that feel they have been too severely dealt with. However, a check of this does not bear out such reports. As far as can be determined, the only settlements being held up by Washington relate to contracts of less than $500,000 because it has been proposed by a bill in the House to exempt such contracts from the Renegotiation Act. This bill was introduced by Representative Doughton of North Carolina, chairman of the Ways and Means Committee, and has the backing of at least two of the services that have been renegotiating various war goods contracts.

It is difficult at present to determine what effects renegotiation of contracts will have on war production. There is no question that the thought of the whole thing as it is now being carried out is frightening and discouraging. However, if it only goes this far it will not be too bad, but there are indications that it may be damaging to war production. While specific cases are not at hand, there have been a number of reports that manufacturers, having gone through the renegotiating mill once, are hesitant to take new contracts because they don't want to face it again.

Attempts to verify this report with actual instances have not been successful, but the consistency with which the reports reoccur indicates that there is either some truth to them or Axis propaganda is skillful.

Gear Sales Increased 10.5 Per Cent in March

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows an increase of 10.5 per cent in the business booked in March, as compared with February. The March index figure was 334 compared with 303 for February.


INDUSTRIAL GEAR SALES
(Does not include automotive or high speed turbine gears)
1928 = 100
AVERAGE MONTHLY SALES
AVERAGE MONTHLY SALES
Index numbers
Source: American Gear Manufacturers Association
The Iron Age
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941
J F M A M J J A S O N D J F M A M J J A S O N D
1942
1943

Camco Acquires Outstanding Stock

Cleveland

• • • **Stockholders of the** Cleveland Automatic Machine Co. have empowered the board of directors to purchase outstanding shares of the company's $7 cumulative preferred stock. It is the intention of the board to pay $90 a share for the stock tendered, upon which accumulations of dividends total $68.25 as of Dec. 31. It is understood that the bulk of the 16,946 preferred shares outstanding has already been tendered.

James J. Laughlin, Jr., of Miller & Hornbeck, attorneys, has been elected a Camco director. Millard Brainard of Otis & Co. has been elected treasurer, an office formerly held by Col. James Hammond, Jr., president of Camco.

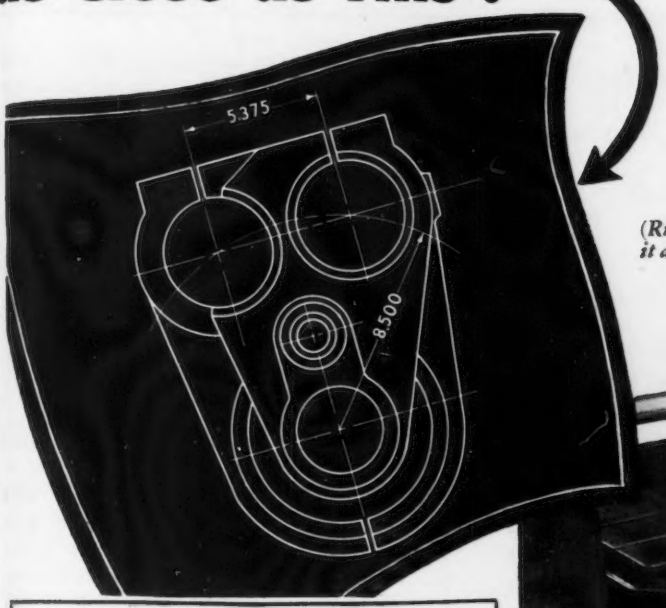
•

Women Being Laid Off

Cincinnati

• • • **There are** some indications that the industry is now working downhill on its mountain of orders. Manufacturers of heavy machinery, always the last to feel any change in the market situation, continue to operate at full speed under extreme pressure. There is an easing up as a result of which some employees have been laid off, chiefly women, since the industry is still clamoring for more masculine employees.

Can You Hold Bore Locations as Close as This?

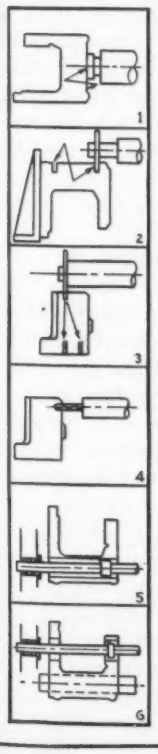


(Right) Operation 6 as it appears on machine.

Versatility:

FOR PROPER MACHINING SEQUENCE

Proper machining sequence is available through ample feeds and speeds and versatility of G & L Machines. The operations sequence on the arbor support, as performed on the G & L, is shown below.



1st Setting

OPERATION 1—Mill for locating purposes.

2nd Setting

OPERATION 2—Place on angle plate. Saw two 1/8" slots—with table feed.

3rd Setting

Same as 1st Setting, but turned 90°.

OPERATION 3— Saw three 1/8" slots—saw with head feed.

OPERATION 4—Drill *and Tap* three stud holes 25/32 drill—3/4–10 tap.

4th Setting

Place on Top Milled Surface.

OPERATION 5—Bore 2 holes.

5th Setting

Place part on dummy overarms.

OPERATION 6—Bore 2 holes. See machine illustration above.

Operations Performed on G&L include:

BORING, DRILLING, MILLING, SAWING *and Tapping*

This prominent manufacturer of machine tools uses his G & L Horizontal Boring, Drilling and Milling Machine for short run boring operations requiring extreme accuracy. On this arbor support the locations of the bores are held to exact drawing dimensions. It is a special support designed to fit a machine already in service. Each of the bores is cut with a saw for clamping purposes, and the part had to be bored so that when attached to the machine in the customer's plant the accuracy would be maintained.

G & L machines are being used for an endless variety of machining operations on both small and large parts in many industries. With G & L attachments and accessories there is practically no combination of operations that cannot be performed with great speed and economy. Feeds and speed ranges cover all metals, and practically any cutting requirements.

G & L engineers will be glad to make recommendations for faster machining of your work on G & L equipment. They are at your service.

GIDDINGS & LEWIS MACHINE TOOL COMPANY

136 DOTY ST., FOND DU LAC, WISCONSIN

FREE DATA *Information covering the complete line of G & L machines and time-saving attachments and accessories is included in this catalog. Write for your copy. Ask for Catalog No. 53.*

NON-FERROUS METALS

. . . Market Activities and Prices

National Bronze & Aluminum Indicted

Cleveland

• • • **Indictments against** the president and six top officials of the National Bronze & Aluminum Co. Cleveland, were issued this week on charges of conspiring to make and sell defective warplane parts. This is the first case against a war equipment manufacturer invoking the sabotage act.

At the same time, the federal grand jury named but did not indict 21 other employees of the company as co-conspirators in the plot. John L. Schmeller, president of the company, stated that the charges were groundless and that a plea of not guilty would be made. Statements of huge profits by the company were refuted by pointing out that the best year of business only netted around $300,000.

•

High Lead Alloys for Coating

• • • **Due to the necessary** restrictions on the use of tin and zinc, the use of lead alone, and also alloyed with small amounts of tin or zinc or both metals, is being advanced as a replacement coating for hot galvanizing and hot tinning. Alloys of lead and tin have been used as solders and as terne and other dipping coats. Such operations were formerly carried out with alloys containing from 15 per cent tin and up to as much as 63 per cent tin—the eutectic composition.

The present trend is to use alloys containing 90 to 95 per cent lead, with either tin or zinc or both metals making up the rest. Small amounts of antimony, bismuth or silver may be added for different reasons. Some instances are reported, of the use of lead alone successfully, as a substitute for hot galvanizing pole line hardware parts.

New high lead alloys have been developed, such as "Plate-Loy" to replace the zinc bath in hot galvanizing. No changes in process or materials are required other than the substitution of the new alloy for zinc.

The use of 100 per cent lead to replace hot zinc is somewhat more complicated than the above because there is no alloying or bonding element present.

A series of lead-tin alloys varying from 90 per cent lead and 10 per cent tin to 99 per cent lead and 1 per cent tin is available, which can be applied by regular hot galvanizing or hot tinning practice, but at temperatures between 650° to 750° F.

•

New Silver Alloy Brazing Flux

• • • **Scaiflux 21, a silver alloy** brazing flux, has been made available to users of silver alloy brazing by Scaife Co., Oakmont, Pa. Scaiflux 21 is a low surface tension flux that Scaife has developed through its Mellon In-

SOME EVENING, SPRING THIS ON YOURSELF

LIKE brain-twisters? Some evening, then, when you're in the mood, take a crack at this one: Imagine a square plane supported at the corners by equal springs. Place your finger at any point on the board and press downward. For the sake of argument, assume you push with a force of ten pounds, that the springs are centered, a foot apart and the spot you have pressed upon is 3″ one way and 2″ the other way from the center. Can you figure the proportion of the load shared by each spring? The practical equivalent of the problem is found, for example, in the design of springs for applications requiring vibration or shock isolation. The answer looks deceptively easy, but it will challenge you. From a spring maker's viewpoint it is a problem of springs working in combination, a worthy example of our experienced knowledge that there is only ONE right spring for your job. We can produce it for you.

WHAT DO YOU NEED?... *A spring manufacturer with adequate capacity to do your job now? Help in designing springs as well as manufacture? If it's essential for the war, get in touch with us.*

HUNTER
Science in Springs

HUNTER PRESSED STEEL COMPANY, LANSDALE, PENNSYLVANIA

stitute Fellowship for use in its own armament brazing operations. This new brazing flux is said to speed production, cut costs, simplify silver alloy brazing. It is further claimed that it is well adapted for use in brazing any type of ferrous or non-ferrous alloy.

Scaiflux 21 has a low melting point and low surface tension. It is fully active at 900 deg. F. Melting at an exceptionally low temperature, it spreads evenly over the surfaces to be joined, dissolving all of the oxides.

•

Export Prohibited

• • • **The Office of Exports,** Board of Economic Warfare, has prohibited the export under general intransit license, with certain exceptions, of the commodities listed below, effective May 15, 1943. Intransit shipments of the commodities which are within the United States prior to the effective date of this change may be exported under the provisions of general license provisions.

The commodities covered are:

Commodity Description	Commodity No.
Babbitt	6620.00
Brass and bronze	6440.00 thru 6479.98
Copper	6425.00 thru 6439.98
Gold manufactures	6997.00
Magnesium powder	6691.01
Manganese	6645.40 and 6649.40
Nickel silver	6610.00
Nichrome wire	6630.00
Platinum	6929.05 and 6929.98
Radium, metal	6649.50
Tin	6565.09 and 6565.98
Zinc dust	6586.00
Zinc manufactures	6589.01 thru 6589.98

•

Non-Ferrous Founders Organize

St. Louis

• • • **The organization meeting** of the Non-Ferrous Founders Society, held here, April 29, at the Hotel Jefferson, was attended by about 145 members and non-ferrous foundry executives.

C. K. Faunt, Christensen & Olson Foundry Co., Chicago, was elected president of the society, and E. W. Horlebein, Gibson & Kirk Co., Baltimore, was chosen vice-president. Secretary-treasurer is R. M. McClure. The society maintains offices at 914 National Press Building, Washington, and at 111 West Washington St., Chicago.

The society is an organization of non-ferrous jobbing foundries whose principal output is in copper or copper base alloys. It is planned to provide this group with representation in Washington and with other governmental groups and to keep its members informed of new developments in federal regulations.

In addition to a business session, the new OPA price order MPR 125 was discussed at the meeting and a report was made on the steps taken in connection with the society's formal request to OPA for modification of provisions of MPR 125.

Directors of the society elected at the meeting include: the president, vice-president, and T. H. Addie, American Manganese Bronze Co., Philadelphia; A. M. Cadman, A. W. Cadman Mfg. Co., Pittsburgh; J. A. Duncan, William Duncan Co., East Boston, Mass.; F. J. Eberhardt, L. Fischer, Fischer Casting Co., Plainfield, N. J.; James F. Gilbert, Gilbert Brass Foundry Co., St. Louis; George B. Hazen, Brass Foundry Co., Peoria, Ill.; Thomas S. Hemenway, Metal & Alloy Specialties Co., Inc., Buffalo; W. J. Hunter, Hunter Foundry Co., Chicago; Roy M. Jacobs, Standard Brass Works, Milwaukee; Albert Meskan, Louis Meskan Brass Foundry, Inc., Chicago; William E. Paulson, Thomas Paulson & Sons, Inc., Brooklyn; Charles H. Stokesbury, Derby Castings Co., Inc., Seymour, Conn.; Oscar Swangren, Dorchester Brass & Alumnium Foundry, Inc., Hyde Park, Mass.; L. M. Nesselbush, Falcon Bronze Co., Erie, Pa.; Harry Burgin, Bridesburg Foundry Co., Philadelphia.

Ribald and often profane, he greets the gamut of weather believing that his youthful ideals are hidden by a rugged outpouring of words.

But out in the shelter of fox holes, or slogging through mud to a post near the front, he communes with his thoughts as companions. . . . A picture of home is in his memory—he thinks of poignant moments he hopes to recapture, when he comes back, matured from a Galahad boy into manhood.

The fulfillment of these thoughts of return depends upon what we do Now in Production, in the Purchase of Bonds, in the Preparations for Peace. . . . For you this preparation may include new intricate machines that you want made practical and then built for use or sale.

This is the kind of problem you can even now bring to FIDELITY. As a first step, write for your copy of "Facilities"—a booklet that tells you about our organization and what it can do for YOU.

Designers and Builders of Intricate, Automatic Precision Machines

ARMY (E) NAVY

32 YEARS' EXPERIENCE

FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE, PHILADELPHIA, PA.

SCRAP

. . . Market Activities and Prices

Pig Shortage May Cause Scrap Rush

• • • **Scrap movement** over the country is not much different than it has been the past several weeks with the exception of local changes having little overall significance. At some locations a cast scrap shortage is reported developing which possibly reflects a tighter pig iron condition. Dealer scrap has been a little easier but the supply is still affected by the manpower shortage and unsatisfactory collections. Heavy repairs for blast furnaces, many of which are now overdue, may cause a grand rush for scrap by August or September, some observers seem to think. On the whole little concern is being shown over future supply.

Chicago reports a higher volume of scrap movement the past week but features a dearth of heavy material. Reports from farm collections in that district and a number of other districts where preliminary reports are available have been disappointing. While not important at this time, it should be remembered that the WPB in its estimates has placed greatest reliance on the farms to produce the bulk of heavy civilian scrap. This may not appear judging from early reports.

Railroads are expected to produce more scrap of the usual heavy character later this year when carbuilding and track relaying programs get more fully under way.

St. Louis reports scrap volume sufficient to permit full operations by the mills without drawing on reserves while Cincinnati reports similarly but cites the increasing trend toward specification choice by consumers.

Buffalo, long haunted by manpower shortages and an oversupply of turnings, reports increasing volume with all grades moving moderately—even turnings. Consumers there complain of the quality but not the tonnage.

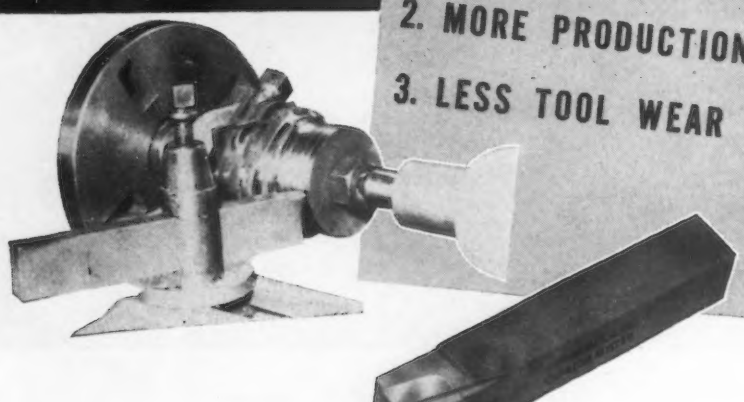
Boston reports that Nos. 1 and 2 steel with bushelings in the same car are going out as fast as available and a brisk demand for stove plate and breakable cast. WPB salvage reports from the New England states are not too promising placing many of the group of states down in the 17th to 19th position.

Philadelphia dealers who have been confronted for some weeks with a partial or complete ban on shipments temporarily are looking to an easing of the situation when the 6 per cent freight increase of March 18 is removed from shipments May 15.

Canadian Finance Minister Ilsley anounced that imports of cast iron scrap to be remelted are not now subject to the 10 per cent war exchange tax previously collected. The tax was removed by order-in-council, May 5. Mr. Ilsley recommended removal of the tax on grounds that the cost of imported cast iron scrap delivered to Canadian plants is about 25 per cent above the ceiling price.

KENNAMETAL* TOOLS ASSURE EFFICIENT PRODUCTION THROUGH...

1. FASTER STEEL-CUTTING
2. MORE PRODUCTION
3. LESS TOOL WEAR



1—KENNAMETAL carbide tools machine steel at faster speeds, with husky feeds and deep cuts.

2—Because of this ability to cut faster, KENNAMETAL turns out more finished products in a given length of time.

3—The extreme hardness and crater resistance of KENNAMETAL tools hold tool wear to a minimum.

By machining more finished pieces per tool in less time, KENNAMETAL produces machined steel parts efficiently.

Write today for your copy of the KENNAMETAL catalog, #43B.

KENNAMETAL THE All American CARBIDE

* INVENTED AND MANUFACTURED IN U.S.A.

McKENNA METALS Co.

144 LLOYD AVE., LATROBE, PA.

Trade Mark Reg. U. S. Pat. Off.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York (Exclusive of Canada and Great Britain)

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the crresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of $2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their planes. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B: switching district of Kansas City, Kan., Mo.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	May 11, 1943	May 4, 1943	Apr. 13, 1943	May 12, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	May 11, 1943	May 4, 1943	Apr. 13, 1943	May 12, 1942
No. 2 fdy., Philadelphia	$25.89	$25.89	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.00
Foundry coke, prompt	7.375	7.375	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 164 and 168.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
May 11, 1943	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	$4.50		$4.50												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.39¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢[13]	2.27¢	2.40¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢[13]	2.27¢		2.49¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
								(Coatesville and Claymont = 2.10¢)							
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.94¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

SEMI-FINISHED STEEL

For exceptions, see preceding page

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.25 higher; f.o.b. Duluth, billets only, $2 higher. Delivered prices do not reflect new per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	$54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.25 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

N. E. STEELS (Hot Rolled) Mill Extras for Alloy Content

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8020	.18/ .23	1.00/1.30	.040	.040	.20/ .35			.10/ .20	.45	9.00	.95c	$19.00
NE 8442*	.40/ .45	1.30/1.60	.040	.040	.20/ .35			.30/ .40	.90	18.00	1.40	28.00
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/ .65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.20/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30c	$26.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9630	.28/ .33	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9635	.33/ .38	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9637	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9640	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9642	.40/ .45	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9645	.43/ .48	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9650	.48/ .53	1.30/1.80	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00

***Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

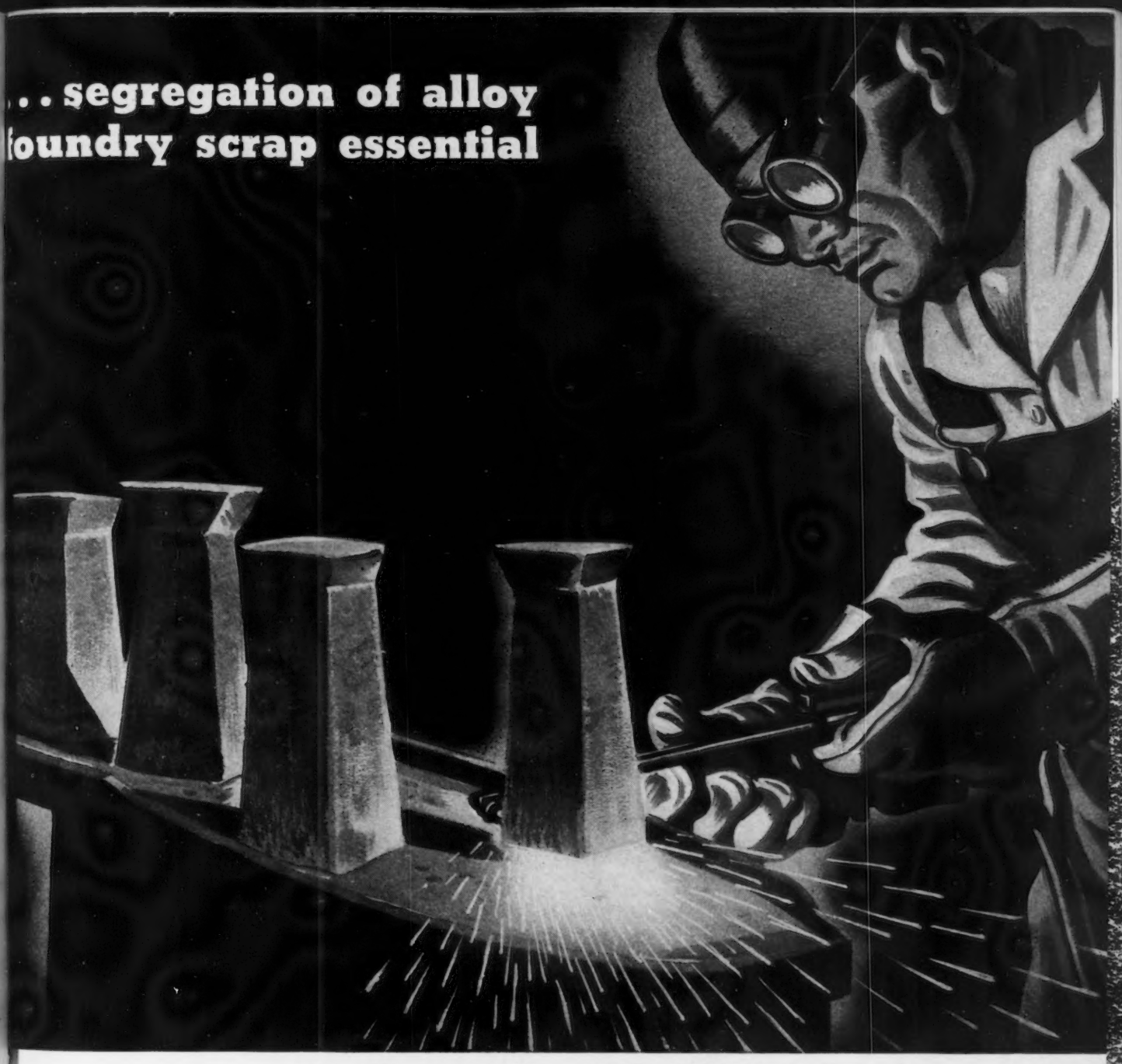
Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00



Information supplied by an Industrial Publication

Efficient utilization of recoverable alloys in foundry scrap, which is of vital importance today in foundries making alloy castings, depends primarily on thorough scrap segregation.

The principal factors to be considered in segregation are: positive identification of scrap, adequate storage facilities and constant supervision.

Several methods of sure identification are available. For example, riser shapes can be varied according to composition. Core wires can be inserted in sprues. Molds can be marked to indicate special handling of sprues, gates and risers. Paint of different colors applied after shaking out is a simple, effective method.

Adequate storage space implies first, sufficient room to keep scrap segregated in storage. The amount of space provided should also take into account the ultimate disposition of the scrap. That is, will it be used by the foundry storing it, or be allowed to accumulate before shipment elsewhere?

Proper and continuous supervision is essential to thorough segregation. In fact, it is doubtful if any segregation program will be completely effective unless someone equipped with adequate authority is made directly responsible for maintaining it.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

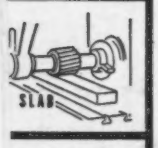
MOLY

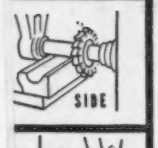
Climax Molybdenum Company
500 Fifth Avenue • New York City

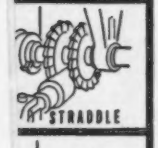
FOR PRODUCTION MILLING OF SMALL PARTS

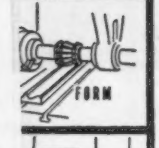
. . . IN STEEL, CAST IRON AND ALUMINUM

Use any one of three Standard Rigidmils









VAILABLE
ERATIONS

(At Right) Illustration shows effectiveness of two-way table cycle. Operator merely changes work piece in fixture at end of table opposite from milling. Loading time is free.

ALL of these milling operations can be performed on practically all metals with Sundstrand Rigidmils. Three sizes are available and whether your work consists of short run jobs in various metals or long run production you can mill either way by merely selecting the machine large enough to handle all of your parts.

High Ratio Spindle Heads For All Metals . . .

Each of the three standard Rigidmils is supplied with either one of two unusually large spindle speed ranges. Speeds for every milling job in any metal for all cutter sizes within range of the machine are easily obtained. See the specifications below for spindle speed ranges.

Wide Range of Hydraulic Feeds . . .

Infinitely adjustable hydraulic feeds together with the wide spindle speed range permit adjustment of both to obtain the best possible cutting condition and maximum production regardless of the metal being machined.

Vertical Spindle Heads

are available as extra equipment. These add further to the versatility of Sundstrand Rigidmils in handling a large range of set-ups.

(At Right) Vertical spindle-head available as extra equipment on No. 0 Rigidmils. Similar spindle-heads available for each of the three standard Rigidmils.

For Long or Short Run Milling Jobs . . .

High rapid traverse and quick acting controls reduce non-productive time on long run jobs. Simplicity of feed and speed adjustments together with ease of set-up and change-over enables Sundstrand Rigidmils to offer similar production advantage over general purpose equipment on short run work.

SUNDSTRAND ENGINEERS CAN HELP IN SELECTING MILLING EQUIPMENT

Let our engineers assist you in selecting the proper Rigidmil for your work. They will be glad to study and make recommendations on more productive methods or suggest changes which may increase production or lower cost. They are at your service without obligation. Use this service freely. Send complete accurate information with each inquiry.

FREE DATA

These interesting bulletins cover the Sundstrand No. 00, No. 0 and the No. 1 Rigidmils. Get the complete information on this versatile line of milling machines. Write for Bulletin No. 512.

MAKE A PRELIMINARY SELECTION FROM THESE BASIC SPECIFICATIONS →

These specifications cover the basic dimensions of the three smallest* Sundstrand Rigidmils. If your job requires a machine of different capacity or model send prints and production requirements for preliminary recommendations — no obligation.

** Larger sizes also available.*

SPECIFICATIONS	NUMBER 00	NUMBER 0	NUMBER 1
TABLE—Max. travel	8" Std.	18"	18"
Working surface of table	7½" x 25"	8" x 46"	10⅜" x 46"
Top of table to spindle	9⅞" max., 1½" min.	13" max., 2½" min.	14½" max., 3¼" min.
Hydraulic feed range	½" to 37" per min.*	½" to 38" per min.*	½" to 31" per min.*
Hydraulic rapid traverse	400" per min.	325" per min.	345" per min.
SPINDLE—Nose	No. 40 N.M.T.B.A. Std.	No. 40 N.M.T.B.A. Std.	No. 40 N.M.T.B.A. Std.
Cross adj. of quill	1¾"	1¾"	1¾"
Vertical adj. of spindle	8⅜"	10½"	11¼"
SPINDLE SPEEDS (by pick-off gears)			
Type A	57 to 2416 r.p.m.	25 to 1200 r.p.m.	20 to 1200 r.p.m.
Type B	85 to 3600 r.p.m.	50 to 2400 r.p.m.	40 to 2400 r.p.m.
SPINDLE MOTOR—Foot Mtd.	¾ h.p., 3600 r.p.m.	1 h.p., 3600 r.p.m.	3 h.p., 1800 r.p.m.

* No. 00: Optional feed range—1¼" to 66" per minute. *No. 0: Optional feed range—1½" to 67" per minute. *No. 1: Optional feed range—1¼" to 55" per minute.

SUNDSTRAND MACHINE TOOL CO.

2539 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.